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Civilization and Philosophy in The Middle Ages, by Maurice De Wulf.

THE DEFECTIVE DELINQUENT AND INSANE

THE RELATION OF FOCAL INFECTIONS TO THEIR
CAUSATION, TREATMENT AND PREVENTION

BY

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WITH A FOREWORD

BY

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FOREWORD

Will the author pardon a frank appreciation of the present lectures by an old friend who has followed the energetic and aggressive work with interest and admiration?

The evaluation of focal infections is an outstanding contribution of twentieth century medicine. To focus the attention upon a potential enemy of health, and fortunately in a field accessible to work without elimination of vital functions, such as we experienced in the days of wholesale ovariectomies and the like, Dr. Cotton has been among the foremost in pushing to its logical end the freeing of the organism of the insidious infections. He appears to have brought out palpable results not attained by any previous or contemporary attack on the grave problem of mental disorder. The advocacy of the aggressive policy unfortunately caught the eager eye of the press and the public before the trial had run the gauntlet of professional criticism and,—what would be more important—retrial at the hands of others. To see the reports and promises spread in a popular or semi-popular course of lectures may add to the tendency to off-hand criticism, yet this is not an age in which paternalism is expected to protect the public with Latin passages when only the initiated should be admitted. Hence why should we judge a frank utterance given at the author's and reader's own risks unless we can offer an equally good and convincing array of facts in favor of a more generally satisfying picture of "things as they are"?

To the physician I should recommend a patient reading, and the determination to judge only by the results of efforts which have been completely carried out. To pull a few teeth without doing a thorough and reasonably complete job, is not doing justice to the demands of the real cleansing. To say that everybody has these difficulties is also a very poor argument. The question is: Does the *thorough* cleansing show advantageous results or not? Is it possible to rouse the conscience for health sufficiently to see to it that the numerous focal infections are attended to before they infest or affect the whole organism?

Can better methods and safe experience reduce the problem to a good preventive and curative technique?

To the lay reader I should give the warning not to sit in judgment over the physician who is conservative and not to run at once to the man who promises marvels. But I should advise those who can do it to ask that funds be put at the disposal of dependable organizations that can put such a promising issue to a thoroughly controlled test. It seems almost impossible to get the support for the necessary organization of controlled work, probably because of the wide-spread illusion that there already exist well-endowed centers of work.

If these lectures stimulate physicians and laymen to furnish means for extensive well-controlled trials, I shall feel that the somewhat extreme claims which go beyond what I personally believe to be my experience, may find their excuse in good results. Let the best agencies come together and give the best talent, the best opportunities for work from all sides. Let criticism be constructive and not only restrictive. Let us see that under proper conditions we may even have a certain surplus of opportunity instead of the deplorable and disgraceful half-way measures with which the study of mental diseases has had to skimp along with just enough for administrative necessities, with hardly a cent of steady support for what the active workers have most longed for and worked for.

The work for mental health must be carried on where active and determined work is the order of the day. The New Jersey State Hospital at Trenton has proved to be such a place. An important experiment is being carried out there. These lectures give a forcible picture of what is being done on focal infections. If means could be made available to carry out and follow out Dr. Cotton's substantial and not merely speculative work, psychiatry would make another large contribution of importance far beyond its own special sphere of mental hygiene, and it would find for its own further development a group of patients relieved of one of the insidious sapping influences taxing humanity, thus offering a free field to work with the many other features which are bound to play a rôle.

ADOLF MEYER.

Baltimore,

April 15, 1921.

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INTRODUCTION

Science has thrown light on almost every field of human endeavor, to the lasting benefit of mankind. Only within the last two decades, however, has the beneficent power of scientific investigation infiltrated the realm of psychiatry.

Prior to the pioneer work of Adolf Meyer, there had been no evidence in America, except in an extremely fragmentary way, of any effort to apply scientific principles to the study of mental disorders. Those physicians are still young who were brought up in the age-old traditions which, like folk-lore, and equally unsuited to the task at hand, had been handed down from generation to generation, without question as to their accuracy and finality. Some of these traditions were part and parcel of the medical lore elaborated in prehistoric times when the function of priest and physician were one.

More than a century ago, general medicine began to break down these superstitions and to rebuild upon a scientific basis. Is it not to be expected that supernatural methods and explanations should have lingered longest about that branch of medicine which dealt with the invisible—the intangible factors of human life and human frailty?

Medicine is, very properly, conservative, for many new ideas are constantly being brought forward—often the result of immature speculation and without any scientific basis—and the physician must necessarily remain agnostic. But there is a distinct difference between fancy and fact, and if a new conception of the etiology or nature of a given disease is advanced, no matter how much that conception may deviate from the traditional teachings, if based upon scientific evidence and proof, it is not to be condemned simply because it upsets all previous conceptions and traditions.

Scientific achievement is usually the result of the summation of a large number of apparently unrelated discoveries, due to independent investigations. This is quite evident in such de-

velopments, for instance, as the aeroplane. Without our knowledge of electricity, and the internal combustion motor, the aeroplane would still be an impossibility. So with medicine and the epoch-making work of Pasteur. He was not a physician but a chemist, who while attempting to alleviate the troubles of the silk industry laid the foundations of the germ theory of disease and revolutionized the practice of medicine.

Malaria, known to all, and showing in its very name, the erroneous notion of its origin, has been proven by scientific methods of study to be due to the parasite of a certain mosquito, instead of to bad air, as was formerly believed.

A host of examples might be cited to show how our ideas have been upset over night, as it were, requiring a readjustment of our thoughts to the new truths which had developed and which today constitute modern medicine. All of these great truths have had to fight their way to recognition through a maze of opposition and apathy, due to the conservative disinclination of mankind to be uprooted from fixed, and crystalized hereditary ideas.

One notable fact in the progress of medical science has been the dissociation of mystery and medicine. Formerly, the public was kept in ignorance of the nature and cause of disease. Such confidence was placed in the physician that, irrespective of treatment, when he appeared the patient immediately improved. The mysteries of medicine were sacred to the physician. He was impressive in garments and gold-headed cane. To further shroud his hypnotic power he wrote in Latin. Great care was exercised lest the patient become too familiar with medical lore.

As medicine developed, however, it became necessary that the public be informed on certain matters, especially those relating to the avoidance of disease, and with regard to legislation to prevent carelessness on the part of the unthinking members of the community. Thus, individuals with contagious diseases came to be isolated and for the time restrained of their liberty. Compulsory vaccination had to be enforced to prevent epidemics of smallpox; pollution of streams used for water for the community had to be prevented because of epidemics of typhoid

fever; stagnant water had to be eliminated to prevent the breeding of the mosquito responsible for malaria. Many other examples could be cited of public enlightenment having been necessary to prevent disease, an illustration of the natural growth of a collective, coöperative and protective power among the citizens of a democracy. This marked a decided change in the attitude of the profession and to none was it more welcome than to the progressive physician.

The writer considers himself extremely fortunate in having spent his early professional life under the inspiring guidance of Adolf Meyer and Stewart Paton. From them, in great degree, has sprung the initiative necessary during the past twenty years for the continued investigation of the problems herein discussed. To Kraepelin and Alzheimer he is indebted for the opportunity to study the subject from the anatomical as well as clinical standpoint, which has furnished the necessary groundwork for later investigations.

More recently, he has obtained help and scientific data from the pioneer work of Billings, Barker, Hastings, Rosenow, King, Draper, Reh fuss, Satterlee, Holman, Winslow, Dochez, Upson and others in the medical profession and from Thoma, Grieves and others among the dental profession.

To Adolf Meyer, John F. Anderson, John W. Draper, and Edwin G. Conklin, he is indebted for scientific advice, for encouragement in the prosecution of these studies and for valuable assistance in the preparation of these lectures.

To the member of the medical, the dental and the laboratory staffs, the Roentgenologist, the supervisors, nurses and attendants, and to the consulting and attending staff of the hospital, grateful acknowledgment is made for their individual interest and ability, and particularly for their persistency of effort and cohesion in the face of many difficulties and discouragements.

This, coupled with a remarkable solidarity of purpose has made it possible to further these researches and to achieve the results herein chronicled.

The drawings of the pathological conditions have been done by the well known medical illustrator, Henry E. Lehmann.

CHAPTER I

THE PROBLEM OF THE INSANE

HISTORICAL

A blot upon our civilization has been the lack of proper care of the insane. Prior to the epoch-making philanthropic work of Dorothea Dix—1840 to 1880—the insane were confined in jails, almshouses, dingy cellars, outhouses, often in manacles and chains. Deprived of medical attention; always in an unfavorable environment; always a subject of gross physical abuse by their keepers and often improperly fed and clothed, their lot in life was a deplorable one. This condition was the result of the traditional fear of the insane who, long before Biblical times, were considered as possessed of devils, incurable; objects, sometimes, of derision and scorn rather than of pity and always of loathing and abuse. So great was the stigma, now happily set at naught, that many families actually hid or utterly repudiated afflicted members.

While there had been feeble attempts in other states, notably South Carolina, Virginia and Massachusetts, to furnish adequate accommodations, it was not until Dorothea Dix, at infinite pains and after long study, memorialized the Legislature of New Jersey, that the modern state hospital system was instituted. The State Hospital at Trenton was the first result of her efforts. Later on, this remarkable woman, hardly known to the present generation, succeeded in obtaining appropriations which established hospitals for the insane in twenty-one states.

The period prior to her emancipating work may well be designated as the "Age of Iron." The treatment by inflexible shackles reflected the inhuman attitude of the public and the profession toward this unfortunate group of patients. Although the physical surroundings of the patients were ma-

terially improved by the establishment of the state hospital system there still remained the traditional fear of the insane patient and while the methods of treatment were modified and improved, mechanical restraint was considered proper and necessary.

Medical treatment did not follow the placing of these patients in so-called "hospitals." They were, in fact, as well as in name, "Asylums." There was but little choice between restraint by iron cages and leather straight-jackets. This was largely because of the persistence of the traditional fear of the patients on the part of physicians and nurses and it was not unusual for patients to be horribly abused. Innumerable deaths resulted from such treatment. This period may well be described as the "Age of Leather." It has been faithfully portrayed by Clifford Beers in his remarkable book "The Mind That Found Itself."

That mechanical restraint is not justifiable was shown over a century ago by Pinel, in France, Tuke, Hill and Conolly in England, and later by C. W. Page in this country. In spite of these demonstrations, which proved both the iniquity and the utter uselessness of mechanical restraint, the officials of institutions persisted in its use and unavoidable abuse.

Even today, at least 80 per cent of all hospitals for the insane throughout the country continue, to their own shame and to the detriment of their patients, to employ mechanical restraint. There is no necessity for it, as the writer can testify from personal experience. When he took charge of the State Hospital at Trenton, in 1907, he found over ninety women in straight jackets and all other forms of restraint were in daily use. In less than two months over seven hundred pieces of restraint apparatus were removed from the wards and since that time no patient has been put in restraint for any cause. The present should be called the "Age of Non-Restraint." It is not surprising that with the state of affairs existing in almost all hospitals there was a total lack of constructive medical work. While nominally called hospitals these institutions were, and many still are, merely custodial asylums.

The first ray of scientific light began to show itself with the

establishment of hospital laboratories and with it dawned the "Age of Research." The names and personalities of Adolf Meyer, Stewart Paton and August Hoch, will remain indelibly stamped upon this very important period. From their initiative and far-sighted vision in the application of scientific research to psychiatry this long neglected and important department of medicine has at length been accorded the position and consideration which is so necessary to its continued development. A forecast of the future should reveal the dismantling of the old asylums and institutions and the development of psychiatric clinics, synthesized and correlated with the groups of sciences which together make modern medicine. Then, and then only, will the defective, the delinquent, the "neurotic," the "neurasthenic" and the "psychotic" receive the modern care to which they are entitled.

Finally, is there any reason why these patients should be denied the physical studies, interpretations and general hospital treatment so profitable to the public at large simply because the infection to which they are subject happens to have affected the brain rather than the heart or joints? The answer is self-evident. Fortunately for the psychiatrist his function of classifying and diagnosing mental disorders will soon become a relatively minor part of his activities. In the future he will extend his work into the fruitful field of relief, so limited under the old regime. This will be made possible only through collaboration with the best minds in medicine and surgery. This *entente cordiale* already developed in other fields of medicine is imperative in the field of psychiatry, for it will terminate the "Age of Isolation" and usher in that much to be desired epoch, the "Age of Treatment and Prevention."

SOCIOLOGIC PROBLEMS

Recent statistics, compiled by the National Committee for Mental Hygiene, reveal the alarming fact that at the end of the year of 1918 there were 232,680 patients confined in the hospitals for the insane in the country. The insane in almshouses, penal and reformatory institutions are not included in these figures. And further, over 75,000 patients are yearly

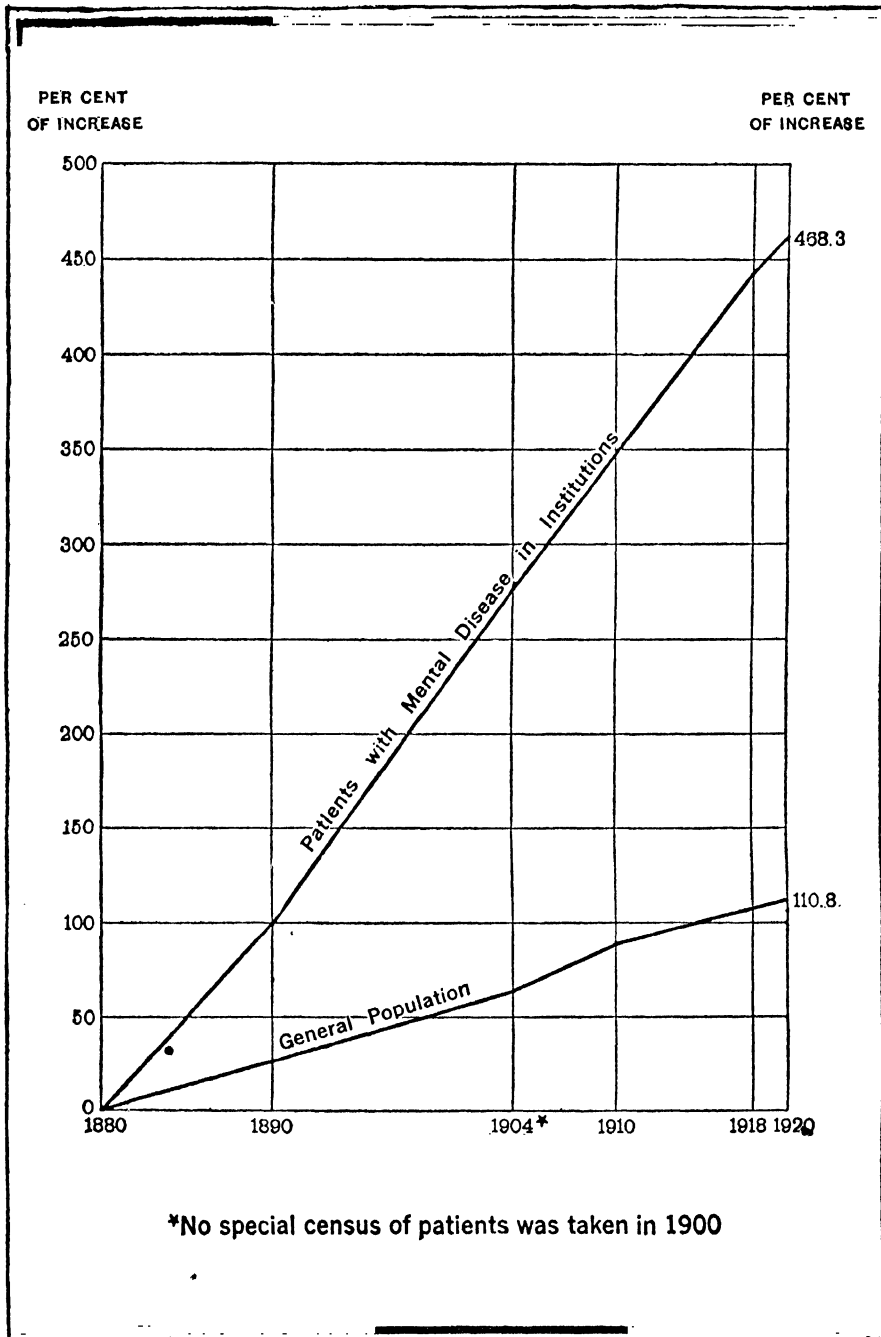


FIG. 1. Increase of patients with mental disease in institutions compared with increase of general population of the United States, 1880-1920. (From reprint No. 103, National Committee for Mental Hygiene, by Pollock and Furbush.)

admitted to the state hospitals. This report also reveals the fact that the increase in the ratio of admission per 10,000 population during the last eight years has varied from 15 per cent in New Jersey to 68 per cent in Montana. In Michigan the increase has been 27 per cent; in New Hampshire 25 per cent; in Massachusetts 26 per cent; in Florida 48 per cent.

Only nine states showed a decrease in the admission rate. This varies from .02 per cent in Wisconsin to 1.4 per cent in Nevada and the latter was the highest rate of decrease reported. The ratio of the insane to the general population varies in the different states, the highest occurring in New York and Massachusetts. These facts show that the reports of the enormous increase in the proportion of insane to the population in this country, are by no means exaggerated, *viz.*: fourfold. (See Fig. I.)

Until quite recently the medical profession and the public in general have viewed this condition with complacency and no serious attempt has been made to solve the enormous medical and sociological problems involved. It has been taken for granted that insanity was inevitable to a certain proportion of the population and that because nothing had been accomplished in the field of prevention and relief in the past, therefore nothing could be done. This general spirit of pessimism in regard to the problem of the insane made the future of this unfortunate class of individuals very dark indeed. But, forbidding as the problem may seem, it is our intention to show not only that there is hope for the recovery of many of these patients, now considered incurable, but also that if the methods herein presented are adopted early by the profession at large, much insanity will be prevented.

While the methods of treatment and prevention outlined herein are not presented as final, it is hoped and believed that like many other incompletely developed preliminary studies in a new field they may furnish a valuable, practical basis for further research which will ultimately result, if not in total prevention, at least, in the material improvement of the status of this great group of misjudged unfortunates.

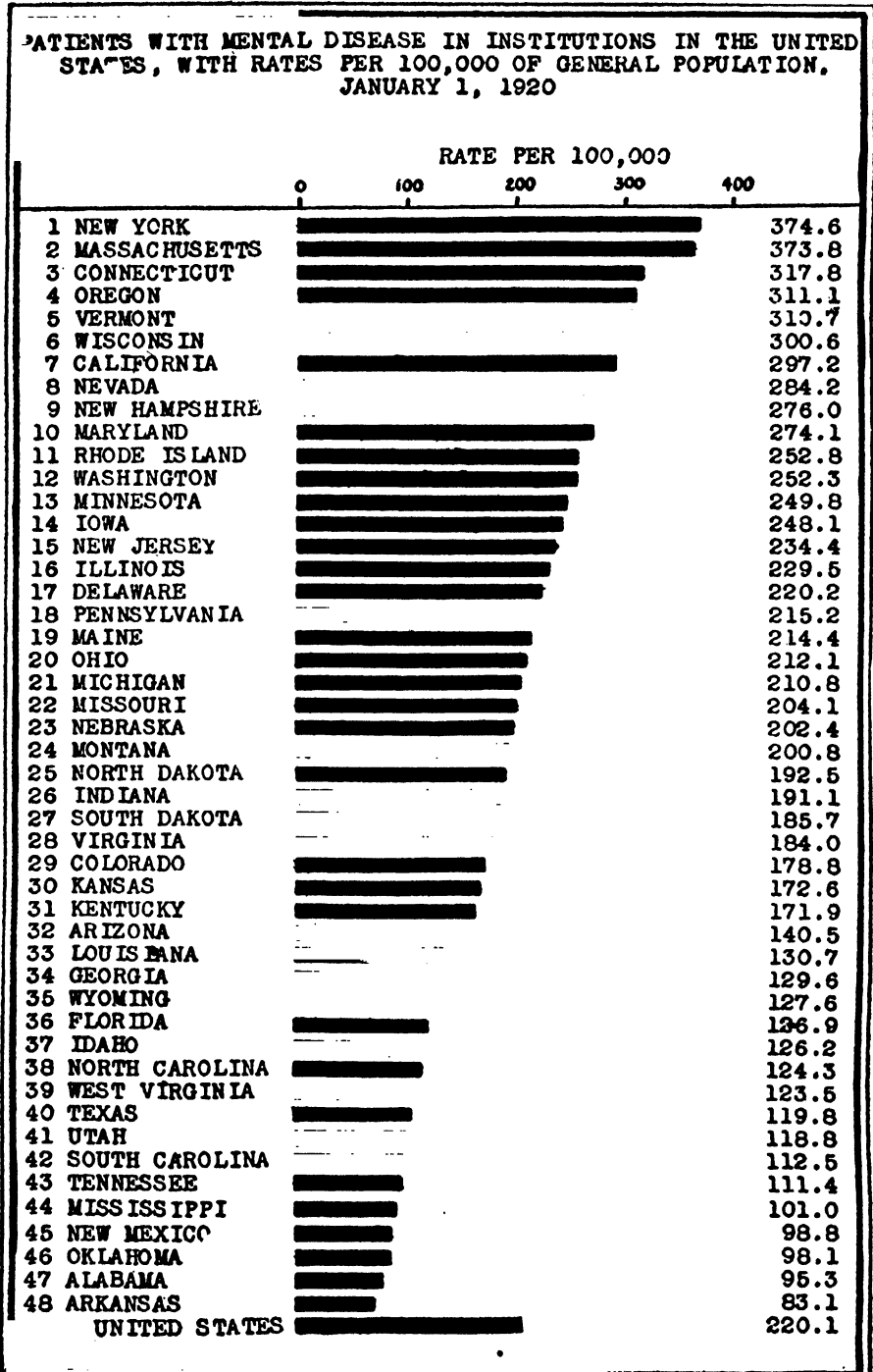


FIG. 2. From reprint No. 103, National Committee for Mental Hygiene, by Pollock and Furbush.

PROBLEM OF THE DEFECTIVE AND THE DELINQUENT

The study and care and treatment of the delinquent class has not kept pace with the study of the same problems in the field of mental disease. It has been only recently that any attempt to depart from the old ideas of punitive criminology has arisen. That the delinquent has sinned and consequently must be punished was the fundamental idea activating all those concerned in the care of these individuals. The public at large had, in great measure, the same idea regarding the punishment of those who came into conflict with the law. Whether or not the individuals were wholly responsible for their acts did not occur to those interested as even a possibility. A crime had been committed and the individual must be confined in an institution not only for punishment but for the protection of society against future crime. With the expiration of a sentence, these individuals were again turned out into the community, many of them in the same condition or often worse than when admitted to the institution. No classification was made. No one attempted to differentiate between the mentally abnormal and the mentally normal delinquents but all were treated alike.

Recent figures, compiled by the Census Bureau, show that there are admitted to correctional institutions of this country over five hundred thousand persons annually. By the introduction of the indeterminate sentence whereby parole boards have a larger latitude in the discharge of prisoners, the population of the various correctional institutions has been materially reduced. But, there is still an ever increasing number of individuals who come into conflict with the law with resulting loss of liberty.

That the public conscience is awakening to the necessity for a better psychological, psychiatric, and physical examination of this class, is evident from the fact that recently a psychiatric clinic, connected with the prison at Sing Sing, under Dr. Bernard Gleuck, has been established, and at the Bedford Reformatory a similar clinic was opened for the study of these problems. The establishment of a psychiatric clinic for correctional institutions of New Jersey is another step forward in the proper classification and treatment of the delin-

quent group. In a few states the courts recognize the importance of such a classification of the delinquent—especially the juvenile types—and insist upon a thorough psychiatric and psychological examination before passing sentence in these cases. The physical examinations are only beginning to receive adequate attention.

While the work in these fields has not progressed to the point where definite information can be obtained, it is conservative to say that from sixty to seventy per cent of those confined in correctional institutions may be classed as normal, the other thirty or forty per cent as distinctly abnormal. One way this abnormality manifests itself is in the individual's reaction to discipline.

Instead of realizing the fact that they have done wrong and that by obeying the rules of the institution they will obtain their release, they develop an attitude of antagonism to the officers and the rules of the institution and have to be disciplined daily for habitual infractions of the regulations. They lose their chance for early parole and discharge from the institution and soon become the trouble makers, easily led into mischief and a source of disturbance in the institution. Continued discipline only makes them worse and yet in a disciplinary institution no other way has been found to treat them.

Such types as described above, from our experience and the experience of others who have taken a progressive and broad-minded view of the problem, do not belong in disciplinary institutions but should be confined in hospitals where their abnormality is recognized, the symptoms properly interpreted and the causative conditions treated. It is evident that the problem of this group becomes one for the psychiatrist, physician and surgeon, rather than as heretofore considered, exclusively for the penologist.

BIOLOGICAL CONSIDERATIONS OF THE NATURE OF INSANITY

For years we have been content to consider mental disorders in two large groups, designated as "organic" and "functional." This division was based upon the fact that in the first group pathological changes in the brain tissue, which could account for

MENTAL DEFECTIVES IN INSTITUTIONS IN THE UNITED STATES,
WITH RATES PER 100,000 OF GENERAL POPULATION,
JANUARY 1, 1920

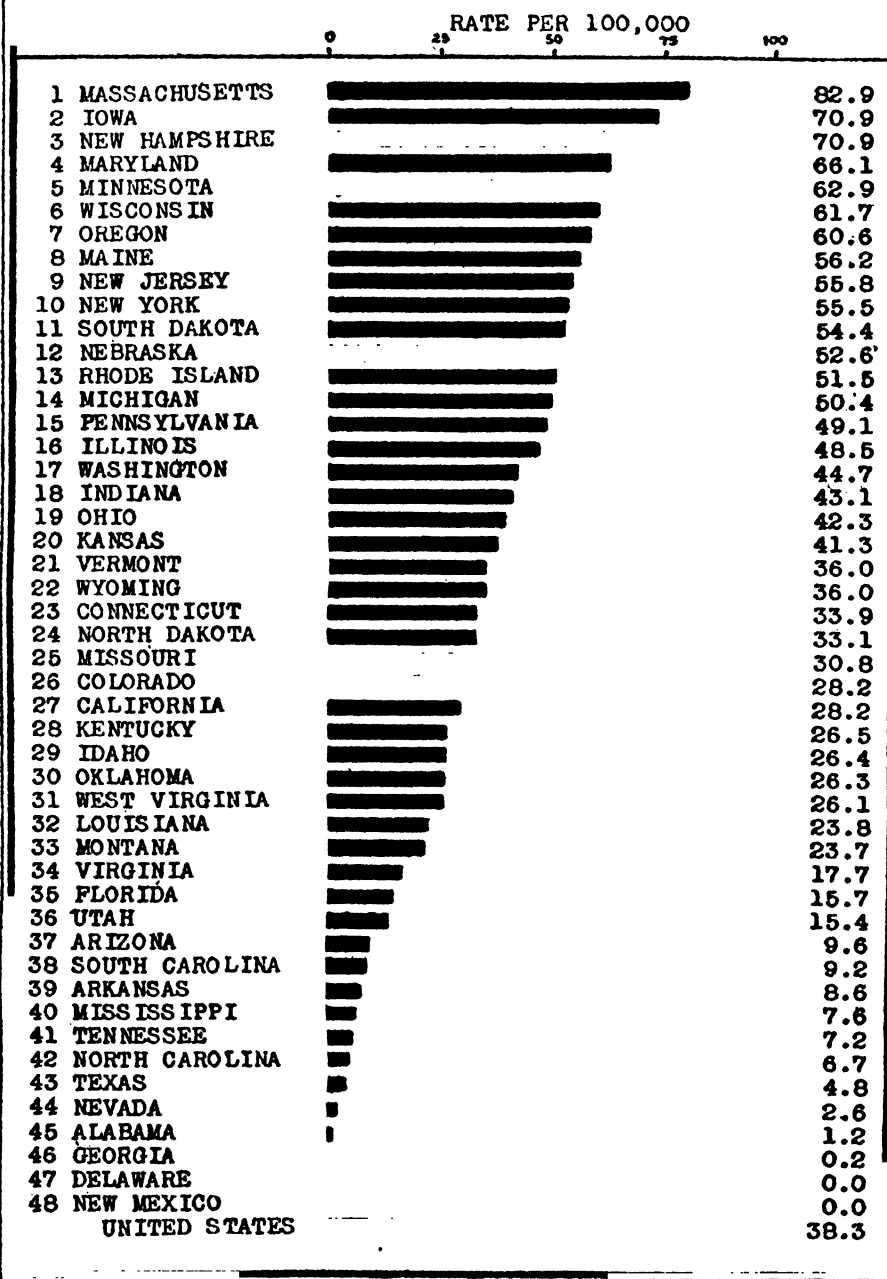


FIG. 3. From Reprint No. 103, National Committee for Mental Hygiene, by Pol-

the "mental disease," were demonstrable, while in the so-called functional group, for a long time, investigations, owing to inadequate methods, failed to reveal changes in the brain which could account for the mental symptoms.

This led to the erroneous viewpoint that certain mental disorders could occur independent of any changes in the brain. From this view we unhesitatingly dissent. A too literal interpretation of Virchow's cellular hypothesis had led to the hasty and erroneous conclusion that because the cell looked normal in arrangement and outline it was necessarily normal in function. Among others, the English physiologist, Haldane, has recently called attention to the gross error of this view. This erroneous hypothesis, that the mind is independent of the brain, was further supported by the fact that no recognizable physical disease was formerly known to exist in these patients. By exclusion, therefore, mental factors came to be accepted as the sole cause operating in this group. It followed that if mental factors caused "mental diseases" necessarily mental treatment was the only method which could promise a cure.

That such a conception is erroneous can be demonstrated by the entire lack of success in such treatment of this type of disease in the last fifty years, during which time the mental picture has been subjected to the closest analysis, and every possible form of psychic treatment has been tried and proved useless. This is evident also from the fact that the percentages of recoveries of this class of patients has decreased rather than increased in the last few years and that at present we have an ever-growing net annual increase in our insane population. In Massachusetts, for instance, the proportion of recoveries to admissions is only 6.9 per cent and if improved cases are included the ratio is only 24 per cent. It is conservative to state that not over 25 per cent of the patients admitted to state hospitals throughout the country are sufficiently improved to leave the institutions permanently. This rate is due entirely to spontaneous recovery, not to any definite therapy, either psychoanalytic or otherwise.

One has only to turn to works on modern medicine for condemnation of this misinterpretation of the relation of function

to structure. Hewlett has recently stated, "It is true that in the last analysis all disturbances of function must be capable of explanation in terms of physical or chemical changes in the body, cells and fluids." Anatomical investigations have repeatedly shown that conditions which have been classed among the functional diseases possess, in reality, an anatomical basis.

Conklin states, "The mind is related to the body as function is to structure." Also, "Any cell may be functionally modified in a thousand different ways without any change being evident to the human eye." This is entirely in accord with the view of many surgeons who have found that the functional disorders of the stomach and other organs reflexly caused by the appendix have been relieved by the removal of appendices which showed neither gross nor microscopic lesions. The explanation of this relief is that the epithelial cells of the appendix have undergone invisible but extensive bio-chemical alterations, permitting the passages into the lymphatics of bacteria and toxins which it was their function to prevent but which alterations, either for lack of time or for other reasons, failed to cause distinctly visible changes.

While psychiatrists, in the past, have held the non-biological view of the nature of the so-called functional mental disturbances, the biologists have produced evidence regarding function and structure which when applied to mental disorders will, undoubtedly, modify these traditional ideas. The biologists are definite in the assertion that there can be no function without structure. This being true it would also be true that there can be no abnormal function without a corresponding abnormal structure. Medical men have been willing to admit this fundamental law so far as it related to other organs in the body but there has been some hesitancy in accepting this truth when applied to the brain and the mind. If we could conceive of a mental state independent of the brain, and all known facts refute such a belief, then we could believe that certain forms of insanity were diseases of the mind and not diseases of the brain.

Conklin is emphatic in his opinion that the mind as well as the body develops out of the germ. It cannot be considered apart from the body. Every known scientific fact substanti-

ates this viewpoint. When the brain tissue is affected or destroyed the patient becomes deteriorated or demented and finally there is no evidence of functioning of the mind. When the brain is congenitally abnormal and does not develop properly, as in idiocy and imbecility, the mind is either retarded in development or entirely absent.

Investigations, in certain types of insanity, as our technique for conducting them has developed, have shown conclusively that a disturbance in the anatomical structure of the brain accompanies the mental symptoms. Thus, in paresis, there are now always demonstrable distinct changes in the brain as a result of the invasion of the brain tissue by the organism of syphilis and finally in such cases the mind ceases to function. In senile dementia, the insanity of old age, it has been found that the disease is a result of definite destructive changes in the brain tissue. In arterio-sclerotic brain disease a similar condition is found, due to the diseases of the arteries and disturbances of the brain tissue. The deterioration in dementia praecox can also be cited as a similar example. In alcoholic mental disorders, on the other hand, while the effect of the poisoning by the alcohol is clinically evident, and while the withdrawal of the alcohol and the elimination of the poison from the system causes the mental symptoms to disappear, the transient changes in the brain cells may or may not cause visible lesions.

With these known facts as a basis one might well inquire why the other types which formerly have been designated as functional and of unknown origin should be considered so entirely different from the types which investigation has shown to bear out the law that function is dependent upon structure. Success in the treatment and prevention of this large group of mental disorders depends upon the establishment of a definite relation between the mental symptoms and pathological conditions in the brain tissue; and while this may be difficult to demonstrate conclusively, sufficient data is at hand to prove that such a relation does exist and that, when the abnormal brain conditions are corrected, the abnormal mental symptoms disappear.

This viewpoint is in harmony with Meyer's well known conception of psychobiology, which he defines as forming "clearly and simply the missing chapter of ordinary physiology and pathology, the chapter dealing with functions of the total person and not merely of detachable parts." His conception of integration is far more logical than the discarded theory of Fechner's psycho-physical parallelism and gives us a better idea of the relations of body to mind. "By making of mind," he says, "something like the religious-philosophic concept of the soul, something opposed to the body instead of a function of the individual as a whole, traditional philosophy and psychology have rendered us a poor service."

His conception of psychobiology is opposed to "the ever lurking interest in the occult and semi-occult" seeking to "replace it by solid confidence in reliable methods and by determined interest in matters obviously calling for serious *objective study*."

In the present state of our knowledge we cannot hope to construct a thorough and finished scheme which will explain everything, but many facts are now known which will help to a better understanding of the relations of body and mind.

INDIRECT ACTION OF PHYSICAL DISORDERS ON THE BRAIN

It should be said that the primary lesion which determines the abnormal mental state is most frequently not to be found in the brain itself. The brain cells are constantly influenced by abnormal conditions in other parts of the body through the circulation. Anatomical lesions of other organs of the body are known to change the metabolism, contaminating the blood with abnormal products, which in turn disturb the chemical exchange and nutrition of the cells of the brain. Thus, frequently there is a direct action on the cerebral elements by the morbid agents carried directly through the circulation. The result may be coarse and extensive lesions, such as result from a large hemorrhage, or fine, diffuse, and frequently invisible lesions; either one of these may be the result of the action of various

toxins. Or, the brain tissue itself, by the invasion of micro-organisms, such as those responsible for syphilis, may be in part destroyed, leaving instead of the normal nerve cells non-nervous replacement elements, a condition which actually occurs in paresis. The effect of toxins of any origin, whether produced by alcohol or by bacterial infection, may be temporary or permanent. Thus, in delirium tremens, the result of alcohol poisoning, we have a profound mental disturbance. This, however, may disappear within twenty-four hours after the alcohol is withdrawn and the patient has had a good night's sleep. No lesion may be found in the brain. In other forms of alcoholic mental disturbance the symptoms may not be so profound, in fact they may be mild when compared to delirium tremens, still the degree of poisoning may be so severe and of such long duration that a withdrawal of the alcohol will not alleviate the mental symptoms and in such cases brain cell changes may be found.

In other words, the changes in the brain, the result of poisoning, may have reached such a stage that repair is no longer possible, even after the toxin is eliminated. They are permanent and often visible. It is logical to assume that these conditions hold good in other types of mental disorders, the result of bacterial toxemias. This explains why a certain percentage of patients among the manias and melancholias recover spontaneously, even when the symptoms exhibited are very profound and severe, while in other types, such as dementia praecox, in which the toxemia is chronic, continuous and of long duration, the patients will go on to rapid deterioration, in many cases showing no tendency towards a spontaneous recovery.

From the fact that certain serious mental disturbances do permit of spontaneous recovery it has been argued that the brain itself could not have been affected, but this is not necessarily true as we have already seen, on bio-chemical evidence, as well as clinically, in delirium tremens. In this condition we know that the brain has been seriously affected but with the removal of the alcohol it becomes perfectly normal again. Therefore, it cannot be argued that because of recoveries in the

acute psychoses the brain has not been affected. Moreover we have seen many recoveries among the acute psychoses occur in a day or two after the removal of the chronic foci of infection.

It is evident from these considerations that the interpretation of the so-called functional mental disorders is following the course already taken in functional diseases of other organs, i.e., *that we have to recognize the physical nature of the disturbance.*

CHAPTER II

CAUSES OF MENTAL DISORDERS

HEREDITY

From time immemorial the influence of heredity has been considered of paramount importance in the causation of mental disease. This doctrine is not only fixed in the mind of the medical profession but also in that of the laity. Among the people at large, whether educated or otherwise, every family is stigmatized by the occurrence of insanity in a member. This viewpoint is so old, so deep rooted an inheritance from past ages that it is almost as fixed as are the immutable dogmas of religion.

We maintain that the doctrine of "hereditary transmission of mental diseases" is very unstable from a scientific standpoint. The term has been used rather loosely and often without justification. The fact that there has been "insanity in the family" often without recording the relation between the member of the family and the patient, is used as a basis for hereditary taint and seldom, if ever, has the character of the mental disease, or the time of life in which it occurred in the parent, been brought into relation with the individual patient. Thus, an individual in a normal mental condition may have contracted syphilis long after children were born and still later have developed paresis and been sent to an institution. Then, from extrinsic causes, a child may have developed mental trouble later on and while there would be no scientific basis for considering heredity as a cause of insanity in this specific case, yet the fact that the father was insane would be considered in most hospital records as distinct evidence that heredity was the cause of the patient's trouble.

No person is able to change his inheritance for that is determined as early as the fertilization of the egg. As to the

immutability of heredity and our strange and fatalistic dependence for what we really are on what has been called the "shuffle of the chromosomes," we have only to quote from E. G. Conklin: "Each living thing in the world has come into existence by a process of development. The entire human personality, mind as well as body, has thus arisen. The factors of development may be classified as intrinsic in the organization of the germ cells and extrinsic as represented in the environmental forces and conditions. The intrinsic factors are those that are commonly called heredity, and they direct and guide development in the main. The extrinsic or environmental factors furnish the conditions in which development takes place, and they modify, more or less, its course."

As is well known, the intrinsic factors are determined wholly by the permutations and combinations of the chromosomes and these are beyond human control. Further Conklin says: "In man there are probably 48 chromosomes. The possible number of different types of fertilized eggs which could be produced by a single pair of parents would be approximately three hundred thousand billions. The production of unique individuals seems to be the chief purpose and result of sexual reproduction."

These quotations are given to show the immense degree of complexity surrounding the entire problem of heredity and also to illustrate the positive, particular and definite facts which have been finally established regarding the mechanism of inheritance. Chief among these, from a standpoint, both of preventive psychiatry and of practical therapeutics, is the immutability of the individual's inherited characteristics and the proof that the trend of these cannot be altered one iota by environment. Under certain conditions they can no doubt be retarded, and under others accelerated, as Stockard has shown; but under no condition can these inherent congenital characteristics be altered. Development may be modified but not heredity. The sooner this biologic law and its important relationship, not only to preventive medicine but to psychiatry as well, is more generally recognized, the better.

While we are thus hopeless, except for the far-off interven-

tion of eugenics, regarding a given individual whose characteristics and traits are irrevocably fixed by his antecedents, we are in no such dilemma as regards the effect on such individuals of pathogenic bacteria and their toxins.

Again, an extensive and important literature is developing as to defects, particularly in the alimentary canal, which defects are coming, or have come, to be regarded as due to hereditary transmission. These defects will be discussed later on.

MALEVOLENCE OF THE DOCTRINE OF HEREDITY

The doctrine of heredity as applied in the field of mental disorders has been detrimental and destructive. Not only have the individuals directly concerned suffered great hardships but others as well. For example, children having a parent mentally affected have hesitated to marry because of a possible "taint," and in addition have been terrified at the prospect of some day developing the same condition. Furthermore, it has exerted a pernicious influence on both the study and treatment of mental disorders. For if we believe firmly in these doctrines of heredity and the "inherited constitution" which means in a broader sense that in certain cases mental disease is inevitable and that nothing can be done to prevent or to cure it, then evidently it would be futile to try to arrest the disease or search for methods of relief except along eugenic lines. It cannot be denied that such has been the attitude of psychiatrists in general and when everything is blamed on heredity, this fatalism assumes the rôle of a cloak to hide our ignorance and stifle initiative in the investigation of causation looking to prevention and relief.

Fortunately, we are today in a position to show that the doctrine of heredity as applied to mental disorders is not in harmony with modern biological knowledge and is, therefore, obsolescent. The "inherited constitution" in the newer sense would refer specifically to the individual's constitutional resistance to various toxins, rather than to merely mental instability. Thus, we have observed in one family the following phenomena: One brother, at the age of 35, developed an acute maniacal condition and died one week after entering the hospital. Ten years

later a sister, who had previously been in perfect health contracted a "grippe" cold and one week later developed an attack of maniacal excitement. On admission to the hospital she was found to have badly infected teeth and tonsils. She died ten days later from generalized infection. At autopsy, cultures from various organs showed a virulent strain of streptococcus, confirming the clinical diagnosis. Another brother, who had been in perfect health died suddenly from streptococcus septicemia. The probable explanation of the deaths of these three individuals was the constitutional susceptibility and lowered resistance to the streptococcus.

The fact is that heredity, even under conditions of clinical examination most favorable to the finding of any possible hereditary taint, exists in only a little more than one half of the patients classed as in the functional group.

In conclusion then, it may be stated that, whatever may be the final decision regarding the relations between heredity and mental disorder, in practice it should be brought down from its present exalted position and more attention should be paid to the factors which lie within our control, unless we deal with the problems of eugenics and control of progeny.

PSYCHOGENIC FACTORS

The traditional attitude of psychiatrists that mental disorders were in fact diseases of the mind and not, as we are forced to believe today, disorders of the brain, has led students of the subject to concentrate their attention exclusively upon the psychogenic or mental factors, ascribing to them and to heredity the most important rôle in the causation of these diseases. No attempt is made here entirely to eliminate the importance of the mental factors in producing a psychosis for they have their proper place. They are, however, of secondary importance to the toxic factors about to be described.

It is idle to deny that worry, grief, shock, mental overwork and other factors have a distinct rôle in this mechanism. They undoubtedly occur in a large number of patients, but, on the other hand, in a number of cases they are absent. Is it not fatuous to suppose that because present in some cases they

must be present in all, even when a thorough investigation fails to disclose them? The relative importance of the psychogenic factors diminishes in proportion as they are found to be absent.

Of what practical value is it to strive to see things that cannot be demonstrated? We are not in accord with the extreme Freudian who wants to account for all psychoses on a sexual basis. Such dogmatic reasoning has led to the conclusion that mental disorders could be cured only by mental therapy and we know that such treatment has been in general very disappointing.

Mental factors are contributory in the mechanism of the psychoses. Such factors undoubtedly lower the patient's vitality—lower the immunity to infection and produce profound physical disturbances. The loss of appetite, disturbance of nutrition, loss of sleep,—the result of these psychogenic factors,—will cause latent infections, which may have existed for years, to become active and virulent.

It is probable that the emotional reactions, having a profound effect upon the ductless glands, lower the resistance sufficiently to allow the latent infection to become active. It must be admitted that the exact mechanism is not known. Further investigations will help to decide the relation of emotional disturbances to the pathology of the ductless glands and infection.

No matter what the outcome of such investigations may be, we do know that the infections should be considered far more important in the production of mental disease than heredity, mental factors, environmental defects, personality, and improper training, because they can be directly controlled.

Many cases occur in which such causes as love affairs, disappointment in love, domestic difficulties, conjugal disharmony, financial reverses,—to mention only a very few,—are considered to be the only cause of the psychosis. In these cases we have never failed to find serious and often extensive local foci of infection. Following the removal of this infection, if the disease has not been of too long duration, the mental disturbance is very apt to adjust itself. Often these patients have to return to the same environment and their domestic difficulties

cannot be disposed of as they should be for the comfort of the patient.

But, in spite of these unfortunate situations, many of our detoxicated and recovered patients have been able to weather the storms and to go through difficulties which would have sent them back to the hospital in former days. One history should be cited to show the effect of detoxication by the removal of focal infection, not only in restoring the patient to a normal mental state, after a period of ten years of almost constant hospital residence, without normal intervals, but also to show how she met and conquered real domestic difficulties after her return to her home.

This patient had suffered from a prolonged depression with intervals of slight improvement, during which efforts had been made to keep her at home, but having on two occasions made attempts at suicide she had to be returned to a private hospital. During this time she had no thought for her husband as she was too self-centred and took no interest in his affairs. As a result the husband became interested in other women. Three months after admission to the State Hospital, she recovered, following the removal of her infected tonsils, her infected teeth having been extracted on admission. The change was most pronounced. When admitted, she was thin, emaciated, and spent her time standing in the corner of her room taking no interest in her surroundings, whining and crying. She gained rapidly in weight and her appearance changed from a very pitiful sight to one of great attractiveness.

When she recovered the husband was reluctant to take her home. She found a very unpleasant condition of affairs. Her husband was infatuated with another woman, of ill-repute, and did everything he could to get her back to the hospital, even threatening her with divorce and bringing this woman to live with the patient's children. Our sympathy was aroused and on investigating the circumstances we found her statement correct and not delusional, as her husband would have had us believe. She accepted a position in the hospital for the time being, hoping that matters would improve. Finally, she returned home and after a year or more of extremely bitter ex-

perience, the situation adjusted itself and there is no further trouble. She recovered in the fall of 1918 and in spite of this harrowing experience she never had any return of her former depression, although, according to those who place so much stress upon the psychogenic factors, there was ample cause. It is significant to note that at the time of the onset of her trouble no psychogenic factors were present, at least not to the extent following her recovery and return home. It is also important to note that the psychosis was of ten years' duration and recovery followed removal of the tonsils.

DISTURBANCES OF THE ENDOCRIN SYSTEM

There can be no doubt that the endocrin system plays an important rôle in the mechanism of mental disorders. The ductless glands, notably the thyroid, thymus, pituitary, adrenals, and sex glands, when they are functioning normally, furnish very definite and specific secretions, which are necessary to the proper development and functioning of the various activities of the entire organism. The activities of these glands are very closely related; disturbance of one undoubtedly causes disturbances in the others. Their function may be inhibitory or stimulating, thus maintaining a proper equilibrium in the body.

The nervous system is very sensitive to disturbances of the ductless glands and we know definitely that the thyroid exerts a specific influence on it, as well as on the sex glands.

Cannon and other physiologists have shown that an infinitesimal portion of a grain of the internal secretion of the adrenal gland will cause an amazing reaction in the bodily metabolism.

Likewise, the absence of thyroid secretion causes a mental condition known as cretinism, in which the patient has all the appearance of an imbecile. If extract of thyroid gland is fed to these patients, early enough, the mental disease may be arrested. There are also other conditions in the adult, known as myxoedema, and caused by lack of thyroid secretion, which can also be relieved by feeding thyroid extract. An excess of secretion by these glands, or an abnormal secretion, may also

exert a toxic influence on the whole body, especially on the nervous system.

The treatment of conditions due to hyperactivity of the glands is much easier than treatment directed to supplying a deficient secretion. In the former case very often the glands can be partially removed by surgical means and thus rid the system of the excess secretion. This is especially true of the thyroid, a large proportion of which can be removed without danger to the patient. The other glands are not so easily removed.

It is not altogether clear what factors are concerned in producing these disturbances of the ductless glands. It has been demonstrated that anger, fear and other emotional disturbances, acting through the sympathetic system, will materially, but transiently, affect the secretions of these glands. Psychogenic factors, then, existing over prolonged periods, may well cause extensive disturbance in the ductless glands, producing at first an abnormal hypersecretion, often followed by a distinct, permanent, structural change. It is possible that such disturbances occur independent of chronic infection, but we have found that these disturbances of the ductless glands are closely related to infection.

Our experience is entirely in accord with that of Billings, Barker and others, namely, that the chronic infections have a direct secondary influence upon the ductless glands. These observers are of the opinion that it is possible to restore the function of the ductless glands by removing chronic foci of infection. For instance, an enlarged thyroid will frequently return to normal, following the removal of infected teeth and tonsils. This restoration, however, is proportionate to the amount of damage caused in the thyroid gland by the circulating toxin. If this damage has gone beyond the point of repair, as is frequently the case, then the abnormal condition can be remedied only by excision of the gland. Very few of our patients were benefited by efforts to correct conditions in the ductless glands, without first eliminating the infection and toxemia. Consequently, we are inclined to believe that infection and toxemia are the primary factors in the majority of cases, and that the disturbance of the ductless glands is secondary.

Further investigation in this field is necessary before final and definite conclusion regarding the rôle of the ductless glands in the mechanism of mental disorders can be reached. Enough is known, however, to make certain that the first step in the treatment is to remove the chronic foci of infection, then, if disturbances of the ductless glands persist, and it can be determined that the failure of the patient to recover is due to such disturbances, measures directed toward this secondary condition should be instituted. It is highly probable that in a small number of our unsuccessful cases the failure is due to the persistence of these disturbances. Much work yet remains to be done in this most important field.

COMBINED FACTORS IN PRODUCING A PSYCHOSIS

From the discussion of the factors involved in the production of a psychosis it can be seen that the causes vary in different individuals. In some cases hereditary influences may produce a distinct susceptibility and create a more fertile soil for the development of a psychosis. Emphasis, however, must be laid on the fact that while this influence may favor such a development it is not essential to its production. Furthermore, while psychogenic factors, when present, also exert an important influence, these may be absent and yet a psychosis may develop. The most important and constant factor is the toxemia resulting from chronic infections.

In the majority of mental cases there is undoubtedly a combination of the factors already discussed and all should be taken into careful consideration in the effort to restore the patient to a normal mental condition. In some instances the hereditary and psychogenic factors may appear to be most prominent and in others the infections and disturbances of the ductless glands. In the treatment of mental disorders it must be realized that hereditary influences are immutably fixed and that frequently the environmental influences cannot be changed. The attack then should be directed upon the factors which can be eliminated from the patient's system, which, in the present state of our knowledge, is limited to the chronic infection referred to above.

Other factors may appear to be the sole cause of the mental condition when, as a matter of fact, they are simply the precipitating factors. These causes may be physical or mental and either may have the same effect. In women, especially, there are several physiological epochs in which the individual is more susceptible to a psychosis. These epochs are puberty, childbirth and the menopause. It is doubtful whether it is justifiable to consider them as having any direct bearing upon the development of the psychosis.

Puberty in the female is attended with more psychological disturbance than in the male. If the girl is unprepared for the appearance of the menstrual function there may be a distinct psychic shock, but without the presence of chronic infection it is doubtful whether this alone would be enough to precipitate a psychosis. It is infinitely more doubtful that this shock could be the cause of a psychosis developing many years later.

Childbirth is the incident which ushers in many psychoses. While the relative percentage of psychoses to births is small, it is far from negligible. The older psychiatrists erroneously designated this as an entity which they called "puerperal insanity." This psychosis does not differ from those produced by many other causes and there seems no justification in considering this to be a special form of mental disease.

It is evident that this physiological incident in a woman's life, because of the severe mental and physical stress and strain, reduces her vitality to a serious degree. In some of the acute mental conditions following childbirth, fulminating infection of the uterus may be the cause of the psychosis. In others, the infection may be a distinctly focal one, occurring in the lacerated cervix. Finally, there may be no definite infection relating to the childbirth and the infection must be looked for elsewhere.

In reviewing a large number of these puerperal cases we have found that the patient harbors infection in the teeth and tonsils, which infection is latent and may become virulent only through the devitalizing effect upon the system of the labor. When these, apparently irrelevant, sources of infection are re-

moved the patient recovers. For example, following childbirth, a young woman developed a psychosis which lasted six months before admission to the hospital. She was admitted in the spring of 1918 in a wildly maniacal condition. Examination showed a torn and infected cervix. This was enucleated and the infected portion removed without apparent benefit. She continued in her maniacal state and it was not until after extraction of four gold capped infected molars that she recovered, which recovery occurred four days later.

Psychoses resulting from the too frequent bearing of children may be explained on the same basis. Hence, it is imperative that the mother, during childbearing age, should be kept particularly free from chronic foci of infection. Any tears or lacerations should be promptly and properly remedied so as not to leave an area of low resistance where, sooner or later, micro-organisms will lodge and produce serious infection. Incidentally, this also relieves her of the grave danger of cancer.

It has been more difficult to explain the occurrence of a psychosis at the menopause. This period has become so associated with serious nervous and mental trouble that it is approached by many women with fear and apprehension. So fixed has this conception become in the minds of physicians in its relation to nervous and mental conditions that such disturbances have been classified as "involutional melancholias" and "menopausal insanities." It is illogical to ascribe abnormal mental conditions to normal physiological phenomena, especially when the same type of mental disease is frequently found occurring at other periods.

From the examination of our cases, it appears highly probable that the menopause, representing a period of decline in the vitality of the individual, permits latent infection to become active. Any emotional or physical disturbances occurring at this time are apt to have a more pronounced effect than at earlier periods. It is not unusual to note the following among women patients. After an attack of mental trouble, during adolescence, there may be normal mental conditions until the menopause, at which time a second attack may occur.

From this, recovery is apt to be slower and they frequently fail to recover, even though the patient be properly treated. There is not the resiliency and recuperative ability which was characteristic of earlier years.

All of our cases, occurring at this period, have shown evidences of chronic infection and when these were eliminated early enough in the disease the patients have recovered. (Case 14.)

Finally, this is the most difficult period in which to treat mental disorders as even with the removal of infection the physical condition of the patient is such that it takes a much longer time for her to recover. A latent infection, which may have existed for ten or fifteen years, may, through lowering of immunity at the menopausal period, become active and virulent.

Menstrual irregularities have frequently been blamed for mental and nervous troubles. These irregularities are, in reality, symptomatic of infection and toxemia in the patient, and like many other symptoms are undoubtedly protective. It is not unusual to note the cessation of menstruation during a psychosis. When the patient recovers the menstrual function is re-established. In some cases cessation may indicate serious infection of the cervix, tubes and ovaries. In others, disturbances of internal secretions may have a direct bearing on the abnormal function. Whatever the origin, it is highly improbable that menstrual irregularities ever stand in direct causal relation to the psychoses. In like manner, sexual excesses and masturbation are properly to be looked upon as symptoms of a disordered metabolism rather than causative factors in insanity.

Certain general infectious diseases, however, bear a very important rôle in the causation of the psychoses. In the last few years, the epidemic of *influenza* has been responsible for the later production of many psychoses. In delirious conditions, occurring during influenza, the direct relation between the influenza and the psychosis will be noted. When the psychosis develops months after the disappearance of the influenza, a different interpretation of the relation of the psychosis to the influenza must be sought. The tremendous devitalization by

influenza of the individual would act as any other physical cause in lowering the patient's vitality, allowing a latent infection to become virulent. All of our post-influenza cases were found to have serious multiple foci of infection, recovering only when the foci were removed.

DIAGNOSTIC SURVEY OF THE PATIENT

It is self-evident that in order to reach these conclusions the psychiatrist has to enlist the aid of his medical and surgical colleagues, and to utilize their methods and findings, adapting them to his own problems. Recent medical developments are fully as revolutionary in general medicine and surgery as are the ideas expressed in these chapters. In fact, the psychiatrist, no matter what progress has been made in psychopathology, cannot afford any longer to disregard the all-important developments in the field of chronic infection. Now that these great truths have been proven and accepted by the leading investigators he should have no hesitancy in adopting them. It is important to state that all the methods utilized in our preparation of a proper diagnostic survey of the psychotic individual are nothing more or less than those in general use in the best equipped modern medical centers.

SUMMARY

Such are the pros and cons relating to some of the aspects of the causation of the "functional psychoses." In brief recapitulation, the most important points are the following: aggressive work in the solution of the problem of the insane is imperative; insanity is increasing out of proportion to the general increase in the population; in spite of, or, perhaps in connection with, our highly developed civilization, the problem of the defective and the delinquent has become an equally pressing one; a small beginning has been made in the establishment of psychiatric clinics for the proper medical study of these conditions and for the proper classification and segregation of the mentally normal and abnormal.

Biological knowledge, based upon evolutionary development,

has been instrumental in clarifying our ideas, broadening our views, and placing the classification herewith presented upon a scientific basis. To biology, also, we are indebted for all of our important knowledge concerning structure and function. It is a biological axiom that there must be a physical basis for all so-called functional disorders and as our knowledge increases, the truth of this, in the entire field of medicine, becomes apparent.

The recognition of this law is of as fundamental importance in understanding the nature of the psychoses as in comprehending disease in other parts of the body. Instead of dealing with disorders of the mind as if they were independent of bodily conditions—a hypothetical conception, based neither upon scientific laws nor upon biological facts and necessarily utterly barren of result as to treatment—we have endeavored to show that we are in reality dealing with disorders of the brain. Such disorders, induced by physical factors, produce the phenomena known as “functional psychoses.”

Heredity, environment, personality and psychogenic factors are given their proper place in the constellation of causation. They may all be absent and yet a psychosis may develop. Their place need by no means be a dominant one, a viewpoint quite at variance with that now generally held.

Psychoses arise from a combination of many factors, some of which may be absent, but the most constant one is an intracerebral, bio-chemical, cellular disturbance arising from circulating toxins, originating in chronic focal infections situated anywhere throughout the body and probably to some extent in disturbances of the endocrin system.

In the following chapters the methods of determining the presence of these foci and the results of their elimination will be considered.

CHAPTER III

THE SYSTEMIC EFFECTS OF CHRONIC INFECTIONS

THE NATURE OF CHRONIC INFECTIONS

Since the epoch-making work of Pasteur, who laid the foundation for the germ theory of disease, remarkable progress has been made in determining the relation of micro-organisms and bacteria to a multitude of diseases. As a result of the work that has been done we have come to believe that nearly every disease process is caused by a specific micro-organism and this has led us confidently to expect that in time specific organisms will be found for all.

The specific causes of typhoid fever, diphtheria, malaria, pneumonia, syphilis, tuberculosis—to mention only some of the better known ills—are now almost as well known as ordinary garden plants, but there are still many conditions in which the causative factors remain unknown and the origin, therefore, obscure. Such disorders as arthritis, neuritis, endocarditis, pernicious anemia, and various disturbances of the gastro-intestinal tract, which until recently had baffled all investigation, are gradually coming to be understood.

Finally to Rogèr, another gifted Frenchman, we are indebted for much of our present knowledge concerning the effect upon the human body of practically all forms of intoxication to which it is liable.

Chronic infections are to be differentiated from acute infections by the fact that the latter are characterized by the presence of pus, pain, and frequently of swelling and by elevation of temperature. These symptoms leave no doubt in the mind of the patient or of the physician that infection is present in a given area. In the last few years, however, it has been found that there is another type of infection which has been

designated as "focal infection," or chronic infection, which frequently gives no evidence to the patient because of an absence of the symptoms, pain, pus, swelling and fever.

These two types differ in many ways. Often a chronic infection persists for years and may in the end actually cause the death of the individual without its presence having been recognized by the methods used in the ordinary physical examinations. That such dangerous infections could exist without giving more evidence has been doubted by many, but recent researches have proven conclusively that such conditions can and do exist and are constantly being overlooked. All too frequently the patient is still merely treated for the symptoms; superficial manifestations for which the physician has been consulted.

The modern methods of clinical diagnosis—such as the X-ray, bacteriological and serological examinations—in conjunction with a careful history and a thorough physical examination, will, in the majority of cases, bring to light these hidden infections of which the patient is usually blissfully ignorant. No individual, suffering from whatever cause, should permit himself to be treated until a proper diagnosis has been made by these methods. It will at once be asked why that priceless, protective symptom, pain, should fail the patient in so critical a moment. The reply must be that pain, like all the protective processes of nature, cannot be one hundred per cent effective and that for some unknown reason it is not often elicited by this most dangerous type of infection.

By means of such examination, which has been termed a "diagnostic survey" of the individual, it has been found that the symptoms of which the patient complains may be caused by an unrecognized infection of an organ or organs situated in another part of the body, which superficially present no causal relation to the symptoms, and of which the patient is ignorant.

These chronic infections are of a very low grade of virulence and show very slow rate of progress. It usually takes years before the symptoms develop as the result of these infections and during this time the virulence of such infection is very slight, or, indeed, may be negative. However, after having gained

sufficient headway, any change in the individual—whether caused by mental or physical factors—may cause a latent infection to become virulent and bring about the death of the patient in a very short time. This quality of mutation or change in the virulency of a micro-organism is one of the most interesting of the many intricate problems arising out of the relationship of parasite to host.

IMMUNITY

All infections call forth defensive reactions on the part of the individual, and these may lead to immunity in which case specific anti-bodies are found in the blood. Were it not for this immunity, in which the body produces a specific substance antagonistic to the various bacteria, we should not recover from any of the many infectious diseases to which we are subject and all vertebrate life would become extinct. In overwhelming infections of extreme virulence the micro-organisms destroy the individual before this immunity can be established. The sudden extinction of the passenger pigeon has been attributed to this fact.

It is necessary to speak only of the wonderful results obtained in artificially producing immunity in such diseases as smallpox by vaccination, and as seen in the late war, in typhoid fever by means of vaccine, to understand the remarkable powers resident in the blood to combat disease caused by micro-organisms. In such conditions as diphtheria, the natural immunity is strengthened by anti-toxin, a serum made by inoculating horses with the diphtheria toxin.

THE ORIGIN OF CHRONIC INFECTIONS

Investigations in the field of chronic infections have conclusively demonstrated that many of the chronic infections originate in the oral cavity, or mouth, and specifically around the teeth or in the tonsils. It was formerly considered that the mouth contained many types of micro-organisms which were non-pathogenic in character, or which were not causing any serious trouble. We doubt the truth of the statement in so far as it refers to the type of organism which affects the teeth and

tonsils, although nearly thirty harmless forms have been found free in the mouth. It is probable that the type of streptococci found in infected teeth and tonsils and which were formerly considered of no importance, may be the agents responsible for the chronic infections originating in the mouth. The importance of oral infection today cannot be doubted and is recognized by the most progressive men in the medical profession.

It is difficult to determine the importance, relatively, of the teeth and tonsils as a source of infection, or, which is primary and which secondary. The age of the individual has some bearing on the subject. In children, it would seem that the tonsils are the primary source of infection and that the infection of the teeth is secondary. In adults, with previously healthy teeth and tonsils, it would appear that the origin of the infection is from the teeth, due to many causes, the tonsils becoming infected secondarily. At any rate, both of them are of extreme importance and it has been shown that infection, originating in the mouth, in the course of time spreads to other parts of the body.

DISSEMINATION OF BACTERIA CONCERNED IN FOCAL INFECTION

Even if the infection remained strictly localized in the teeth and tonsils, it is definitely known that serious systemic effects can be produced. Only in very few cases is such infection limited to the mouth. However the tendency of the organisms to migrate from the primary source of infection and set up multiple secondary foci of infection is of the greatest danger to the individual. The route by which these organisms migrate has not been definitely determined in all cases. In some instances secondary foci may be caused in the gastro-intestinal tract by means of swallowing, but the tendency, more and more, is to look to the blood and lymph streams as the chief disseminators. Once these secondary foci are established in areas which have no connection with the gastro-intestinal tract the only other method of further transmission is, certainly, through either the blood stream or the lymphatic circulation. While it is impossible, conclusively, to determine whether one or both

of these routes are concerned in the transmission, it is probable that the evidence points more to the lymphatic system than to the blood stream. At any rate, it is a fact that bacteria do migrate from the original source of infection and can be found in the joints, muscles, nerve sheaths, the generative organs, gall bladder, lining membrane of the heart, etc.

Another means by which the micro-organisms of focal infection cause serious harm to the individual is through systemic intoxication. By this is meant that highly toxic poison may be carried by the blood stream to various parts of the body, producing harmful effects. This is especially true of the nervous system, in which the trouble is caused, not so much by the invasion of the bacteria in the brain and spinal cord, as by the poison generated by the bacteria. An idea of the small amount of this necessary to produce serious symptoms can be formed from the fact that some of these toxins have been estimated to be upwards of a million times as poisonous as rattlesnake venom. Just how these toxins are formed is not definitely known, but it has been suggested that upon the death of the micro-organisms certain bio-chemical reactions take place, causing these toxic substances to be liberated. Whatever their exact origin, it is sufficient to know that they are capable of causing death within a few days after the onset of symptoms.

CHARACTER OF THE MICRO-ORGANISMS CAUSING FOCAL INFECTION

There are many forms of micro-organisms concerned in the production of chronic infections. The principal ones, however, belong to the streptococcus group which are organisms arranged in either long or short chains. According to their action on the blood, they are divided into hemolytic and non-hemolytic types. The former type is usually more virulent than the latter, although, at times, both may become virulent and cause the patient's death, either directly or indirectly. The two types of the staphylococcus, aureus and albus, are less frequently concerned in focal infections, and probably the latter is never pathogenic. It has been found that the streptococcus group is made up of many different strains, which strains can be dif-

ferentiated by growth on various culture media. This differentiation is important from the standpoint of treatment for it has been found that these various strains do not immunize against each other and that vaccines, to be effective, must contain the strain that is to be attacked.

Below is given a table showing the strains classified according to Holman.

HEMOLYTIC STREPTOCOCCI			
<i>Type</i>	<i>Mannite</i>	<i>Lactose</i>	<i>Salicin</i>
Infreq.	+	+	+
Hemolyt. i	+	+	—
Pyogenes	—	+	+
Anginosus	—	+	—
Hemolyt. ii	+	—	+
Hemolyt. iii	+	—	—
Equi	—	—	+
Subacidus	—	—	—
NONHEMOLYTIC STREPTOCOCCI			
<i>Type</i>	<i>Mannite</i>	<i>Lactose</i>	<i>Salicin</i>
Fecalis	+	+	+
Nonhemolyt. i	+	+	—
Mitis	—	+	+
Salivarius	—	+	—
Nonhemolyt. ii	+	—	+
Nonhemolyt. iii	+	—	—
Equinus	—	—	+
Ignavus	—	—	—

These sixteen types represent the grouping of 1,122 strains of Holman and taken with strains from the literature the total number is 2,463, a sufficient number to come to some conclusion as to their biological types. While some types can be identified under the microscope, only by their cultural reactions can they be accurately differentiated.

We have so far been able to isolate five strains of the hemolytic group; i.e., the infrequenz, pyogenes, anginosus, equi and subacidus, and five strains from the nonhemolytic group; i.e., fecalis, mitis, salivarius, equinus and ignavus. We have found representatives of both these groups in various sources of culture. Occasionally the hemolytic strains are found in the teeth,

but more frequently this type is found in the tonsils and gastro-intestinal tract. Nine tenths of the tonsils harbor the hemolytic strains and often the nonhemolytic strains as well, and it is not unusual to find two or three strains in the cultures from the stomach and duodenum, both hemolytic and nonhemolytic types. Later investigators have shown that the "Viridans" is a form of the nonhemolytic streptococcus, but not all of the latter can be classed as "Viridans." So it is better to substitute the exact type for this term.

This differentiation can be made by growing the organisms upon the various carbo-hydrates media—as shown in the above table. This will avoid the confusion and error now so common of designating all non-hemolytic types of streptococci—"Viridans."

It is useless to argue which types may or may not be pathogenic, or which types may be more virulent than others. We have not found that the hemolytic types were more virulent than the other group or that they produced more marked symptoms. In fact, any of these organisms may become so virulent at any time that they cause the death of the patient, although for a long time they may be latent and no marked evidence of their presence shown other than by the fixation tests.

We are still of the opinion that the complement-fixation tests of the blood for determining the presence of chronic infections are of value as are also the agglutination tests for the same purpose. Further standardization is necessary, however, before they can be used as routine laboratory tests.

A third form of micro-organism, known as the colon bacillus, which is normally found in the large intestine, may cause secondary foci of infection when, probably because of damage to the mucous lining of the intestinal tract, this organism migrates to other organs. It has recently been found that there are many types of colon bacilli, differentiated by means of their cultural reaction on various types of media, probably all of them capable of producing disease, and all extremely toxic.

Whether these various types are pathological variations of a non-pathogenic colon bacillus, or whether they arise from sources outside of the body and are taken into the body with

impure food, milk, water, etc., has not yet been determined. Bacteriological studies in our cases have shown conclusively that they do migrate, having been found in the walls of the intestine and appendix, in mesenteric lymph glands, the gall bladder, the genito-urinary tract, especially the seminal vesicles in the male and within the cervix uteri in the female. In one case the pleuritic effusion and pericarditis was the result of the invasion by this organism.

The tubercle bacillus is usually found in the lung, but it also causes secondary infection in the lymph nodes, the intestinal tract, and other organs of the body. The spirochete pallida, the organism causing syphilis—a venereal disease—is a striking example of chronic infection. It may migrate from the original lesion and remain latent in other organs of the body for years before its presence becomes known, often, too late for remedial measures to save the individual. It frequently involves the nervous system and produces no symptoms for fifteen and even thirty years after the initial lesion, when symptoms of locomotor ataxia or paresis insiduously develop, at which time a comparatively small number only of patients can be benefited by treatment.

MIXED INFECTIONS

Many of the organisms we have above enumerated apparently become more virulent when associated together in the tissues. Thus, the tubercle bacillus and the streptococcus are a bad combination, for the former apparently becomes more active in the presence of the latter. This is probably an example of symbiosis, a condition often observed in nature. In most cases, colon bacilli are found associated with streptococci to the evident detriment of the patient. It is also possible that the organism of syphilis may become more active in the presence of the streptococcus. These postulates receive some support from the dangerous conditions mixed infection is known to produce in tuberculosis.

In view of the intimate relation existing between these organisms which work together—and usually the streptococcus is the one which prepares the way for others—it is easily seen how

necessary it becomes to keep the body, as far as possible, free from streptococcic infection. By recognizing its presence and adopting proper measures to eliminate it from the system the individual will be saved much serious trouble later on.

PRIMARY FOCI OF INFECTION

TEETH

The credit for the recognition of the importance of infected teeth belongs to both the medical and the dental professions. As early as 1908, Henry S. Upson, of Cleveland, called attention to the relation of infected teeth to mental disorders. He cites the fact that Savage, the English alienist, in 1876 reported several cases of acute mania recovering suddenly after the extraction of bad teeth. Upson reported his conclusions, based on thorough clinical observations, that many cases of acute psychoses were caused by infected teeth and that after extracting them the patient recovered. He also emphasized the relation of infected teeth and impacted molars to dementia praecox. Unfortunately, his work was not taken seriously and from our experience in the last three years we can but marvel at the scope of his investigations and his vision of the future development of our knowledge of mental disorders.

His work is more remarkable from the fact that the whole question of infected teeth, from the standpoint of general medicine, was not investigated until some years later. It was only in 1912 that Billings called attention to the relation of infected teeth to arthritic conditions and later Hastings and Rosenow also published conclusive studies in the same field.

The most scientific contribution from the dental profession is the work of Kurt Thoma, of the Harvard Dental School. His work is based upon very thorough and accurate investigations and is well worth the perusal of those interested in the subject. He shows pictures of pre-dynastic Egyptian skulls with undoubted alveolar abscesses. This disposes of the question that infections of the teeth are of recent origin and, therefore, could have no bearing on the mental disorders which existed centuries ago. But, it is undoubtedly a fact that the population, as a

whole, suffers more from infected teeth than did that of several generations ago. It has been estimated that eighty percent of the population have infected teeth and this is, indeed, a conservative figure.

That modern dentistry is responsible for a large proportion of the dental infection of today is admitted by the leaders in the dental profession. The high degree of mechanical skill of American dentists has produced wonderful cosmetic effects, but, unfortunately, the teeth have been treated without regard to the individual as a whole, and without realizing that in their worthy efforts to save teeth, incalculable damage has been done. In spite of the evidence produced by the radiograph and the warnings uttered by the leaders of the profession, the majority of dentists persist in doing work which has been condemned because it may produce serious systemic disease. One has but to examine X-ray plates of teeth which have been treated by the usual modern methods of repair and conservation to see that, in the case of Richmond crowns or pivot teeth, at least, the patient carries a quaint and interesting symbol. In fig. 4 will be seen an excellent example of how the dentist has bestowed upon the patient a "cross as well as a crown," a burden so grievous as to force the individuals, because of the resulting mental symptoms, to seek relief in the State Hospital.

If the dentists persist in this practice, in spite of the dangers which have been shown to result from such work, it is only by educating the public to these dangers that we can hope for an improvement in the health of the nation, both mental and physical. It seems incredible, but it is nevertheless a fact, that the dental schools of today are teaching the installation of gold crowns, fixed bridge work, pivot teeth or Richmond crowns, all of which have been definitely proven to be a serious menace to the individual's health. To paraphrase an old proverb, "Unhealthy is the tooth that wears a crown."

TYPES OF INFECTED TEETH

No attempt will be made to classify all infected teeth or to differentiate the various lesions, but some of the types which are necessary for the education of the public will be described.

Most of the conditions can be determined by a thorough X-ray examination and frequently an inspection of the mouth will reveal the fact that dental infection is present. In no

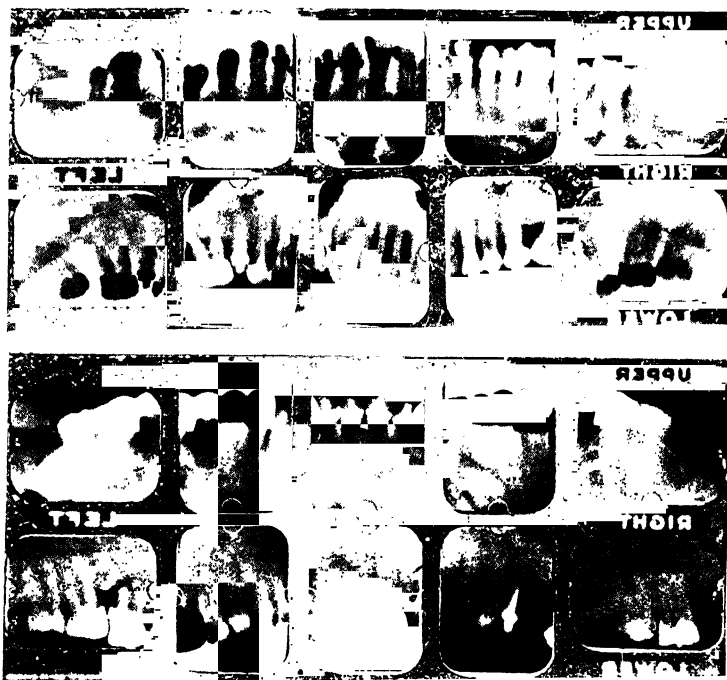


FIG. 4. Radiograph of Richmond crowns or pivot teeth, improper bridge work, and gold shell crowns, from two cases of manic-depressive insanity, in both instances necessitating extraction to eliminate this defective dental work. Note the symbolic crosses.

case should the diagnosis be made on the X-ray picture alone and vice versa no diagnosis of the mouth should be accepted by the patient from the dentist unless radiograms have been made and a proper interpretation given by one experienced in making them. We would emphasize the importance of radiographing *all teeth* and not only the suspicious ones.

UNERUPTED AND IMPACTED TEETH

This form of dental pathology, from our standpoint, is one of the most important factors in producing systemic disease in young people. Unerrupted and impacted third molars are

often overlooked by the dentist because the rest of the patient's teeth may be in perfect condition. The third molars, or wisdom teeth, are most commonly found impacted, but impactions of other teeth may occur. For a long time it was considered that these impacted molars, by pressing on a nerve, caused mental conditions. We have repeatedly shown that all im-



FIG. 5. Examples of impacted and unerupted teeth, from psychotic individuals.
A. Impacted upper canine.
B. Impacted lower third molar, with decayed roots of second molar.
C. Impacted lower third molar, second molar with decayed roots and an apical abscess, first molar capped, with necrotic and fractured roots.
D. Unerupted third molar.



FIG. 6. Radiographs of impacted and unerupted molars.

A and B impacted third lower molar. C Unerupted upper third molar in a case of dementia praecox, whose teeth had been pronounced normal by a dentist without radiographing.

D. Impacted lower third molar in a man of forty with nocturnal convulsions for four years, with cessation of the convulsions after extraction.

E. Partially impacted lower third molar in a case of dementia praecox.

F. Fragmented bisphosphonate

pacted molars are infected—indeed, it is probable that they are impacted because they are infected. The theory of pressure fails to explain the relation of impacted molars to arthritis which has been found in so many cases.

The only satisfactory explanation for the occurrence of impacted and unerupted molars and their influence on systemic disease is the one advanced by us that these teeth are infected early in their development and that by reason of this infection they fail to mature properly and continue to contaminate the system with micro-organisms. While it is true that in young people the wisdom teeth should not come through until a certain age and that an unerupted wisdom tooth at this age may be normal, at the same time we have found impacted wisdom teeth in children as young as thirteen. (See Fig. 30) It is also true that when unerupted molars occur in adults, even though they are not impacted, one is justified in considering them pathological.

A careful bacteriological examination of impacted molars in young adolescents proves conclusively that they are all infected. We have been able to obtain a pure culture of various strains of both the hemolytic and the non-hemolytic streptococci in these cases. The absence of other non-pathogenic organisms in these cultures would eliminate the criticism of contamination at the time the cultures were made.

The question may well be asked, "How do these unerupted and impacted molars become infected?" Often, they are below the gum and embedded in the bone and have no connection with the oral cavity. From the fact that a number of these cases have badly infected tonsils it is reasonable to assume that the infection is transmitted from the tonsils by means of the lymph channels or blood stream to these teeth.

These impacted molars are harmful not only in distributing micro-organisms to other parts of the body, but they will also, in time, infect the adjacent teeth and in cases of long duration it is not unusual to find the entire quadrant also infected. We occasionally find other teeth impacted, especially the canines and bicuspid. They also have been found to be infected.

To the question, "Should these teeth be extracted when they have been accidentally found and the patient presents no sys-

temic evidence of infection?" we would answer unreservedly in the affirmative. It is possible, of course, for young adults to have impacted molars, which at the time are producing no systemic symptoms, but from our knowledge of the harm these teeth can do we would consider them a menace to the patient's health and requiring extraction. There could be no criticism in extracting these teeth for if impacted they could never be of any use to the individual, and are often extremely dangerous. We would also condemn the practice so often resorted to by the dentist of extracting the adjacent molar in order to allow the impacted tooth to grow into position. While this may occasionally cure the impaction it certainly does not eliminate the infection.

What has been said about impacted and unerupted molars would apply with equal force to partially erupted molars. In many cases we find that a portion of the wisdom tooth is protruding just above the gum line and in such cases radiograms will fail to disclose any evidence of infection in spite of the fact that there are definite symptoms and in the absence of other infected teeth such partially impacted molars should be extracted. In an otherwise healthy individual persistent headaches, irritability, insomnia and other nervous symptoms have often been observed. Frequently the pulse is rapid and there may be stomach disorders. These symptoms are often antecedents of serious nervous and mental trouble, and disaster may be averted if they are recognized and offending teeth extracted.

In many young patients, with well developed psychoses, we find that the infection has spread from the impacted molars to the gastro-intestinal tract so that extraction of these molars, alone, will not produce results. The infection must be eliminated in the secondary foci before results can be obtained. The tonsils in these patients must be removed as they are always infected.

A realization of the fact that infected teeth, especially the impacted molars, may occur in very young people and continue throughout the life of the individual, offers a probable explanation for the peculiar personalities and abnormal dispositions

noticed in cases of dementia praecox years before the psychosis, as such, develops. Several cases might be cited to emphasize the importance of impacted molars and infected tonsils in producing serious systemic conditions.

One was that of a previously perfectly healthy and robust girl of nineteen years who had been "ailing" for some time. She was cross, irritable, fault-finding, had frequent crying spells and wanted to spend her time in bed. Fortunately for her, one day at dinner, the gum over the right third molar which was considerably swollen suddenly ruptured while eating. A radiogram revealed an impacted wisdom tooth. This was extracted, but her symptoms continued. Her tonsils had been enucleated over a year previous. All of her teeth were then radiographed and three more unerupted wisdom teeth were found. On extraction, her symptoms rapidly disappeared and for the last two years she has been perfectly well. There can be no doubt that had not these impacted and infected molars been found, sooner or later, she would have developed a serious mental disturbance of more or less permanent character.

The following two cases are cited to show the absence of any definite relation between the mental symptoms and the location of the foci of infection. The first was that of a young, single man, eighteen years of age, with negative family history, who developed a psychosis. His early development was normal. He completed one year of high school at the age of sixteen and worked as a carpenter for a year and a half, but was never successful. For two years he had frequent spells of melancholia and irritability, lasting a few days. He worked at intervals only, was asocial, over-religious and had no interest in the opposite sex. An acute outbreak occurred one week before admission to the State Hospital at Trenton, June 20, 1919, following an attempt to commit suicide by jumping in a lake. He had vague self-accusations, refused to answer questions, and kept repeating, "It is my fault, the devil has got me." Casual examination revealed nothing particular in his physical condition. Shortly after admission he had some sort of an attack in which he lost consciousness, upper extremities rigid, the lower extremities moving up and down, slight

frothing at the mouth, stertorous breathing. His teeth and gums were practically in a healthy condition, but radiograms showed four impacted third molars. The tonsils were enlarged, inflamed and infected. He was depressed and mute, insisting on getting out of bed, and wandering aimlessly about the ward. He broke a window pane, stuck his head through the glass, causing a skin wound. The impacted molars were extracted in August and infected tonsils were enucleated in September. He improved rapidly following the extraction of the impacted teeth and on September 29th, one month later, he was discharged as recovered. For the past year he is reported as normal and earning his living.

The second case was that of a Princeton University student of nineteen years who was somewhat exhausted from his work in the students' army training corps and suddenly, in November, 1918, developed a profound depression with suicidal tendency. Examination showed nothing abnormal except four impacted third molars, revealed by radiogram, also badly infected tonsils. He also showed a serious gastro-intestinal infection which was demonstrated by X-ray studies. He was taken home for Christmas as he had improved somewhat. A few months later he became maniacal and since then has almost continuously been confined in various institutions, but no attention has been paid to the gastro-intestinal tract and there is little hope for recovery until this infection is eradicated.

The mental symptoms in these two cases are very similar, although the first case was more deeply depressed than the second, but he recovered rapidly after the impacted molars and infected tonsils were removed and from his subsequent history it can be assumed that his infection did not seriously involve the gastro-intestinal tract, as undoubtedly was the condition in the second patient.

We would emphasize the fact that in the young patients with psychoses and the juvenile moral delinquents and some pseudo feeble-minded and subnormal children, impacted molars have been present in a large majority of cases. Of course, this condition of the teeth is not the only pathological condition found and it is surprising to note the involvement of the gastro-

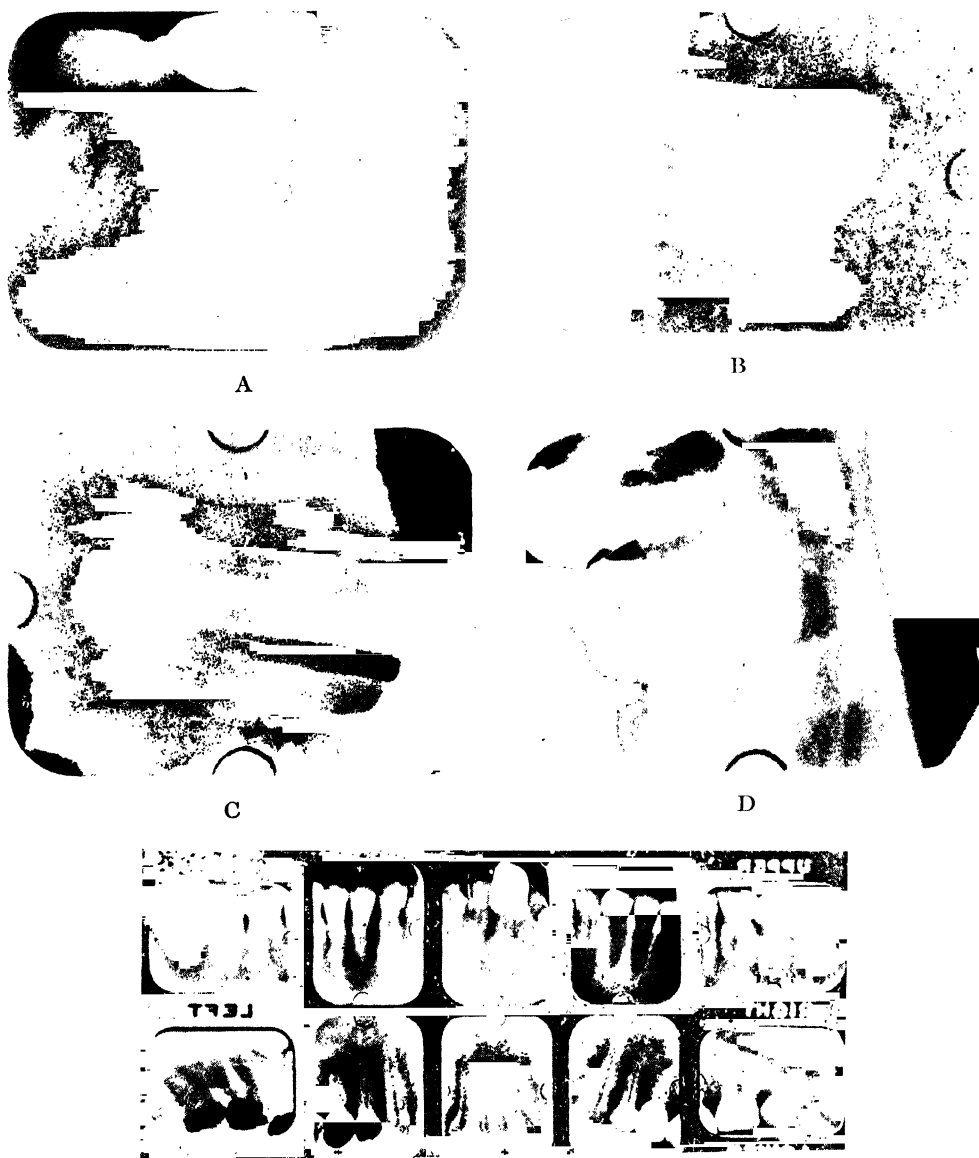


FIG. 7. Apical abscesses or granuloma.

A. Granuloma at the apex of one root of a gold-capped tooth. (Manic-dep. Ins.)

B. Extensive granuloma involving the four lower incisors. These teeth presented no evidence of this lesion from external appearances, as they were not decayed or even filled (dementia praecox).

C. Granuloma involving one lower incisor, nothing to indicate this lesion externally, as the tooth was apparently vital (paranoid condition).

D. Inter-radial granuloma of lower first molar and apical granuloma of lower second molar in case of manic-depressive insanity.

E. Apical granuloma of first molar and bicuspid (lower).

intestinal tract, in extremely young individuals. In one patient, for example, three and a half years, and in another, six years old, severe lesions of the lower intestinal tract existed. These were proven to be present on operation.

TEETH WITH INFECTED ROOTS, "APICAL ABSCESSSES"

This type of infection should be familiar to all dentists and is known as periapical granuloma. It is very well shown by the radiogram in the shape of dark areas indicating necrosis and rarefaction of the bone surrounding the tooth. It is usually found in devitalized teeth—in which the nerve has been killed—or teeth with gold shell crowns, pivots, or Richmond crowns, and usually in all fixed bridge work where the bridges are anchored to devitalized teeth. Not infrequently these abscesses are found at the roots of teeth which, from external appearances, present no diseased condition. (See Fig. 7 and Fig. 8.) There is absence of decay and the only indication may be the presence of receding gums. Any dentist having experience in the interpretation of radiograms should have no difficulty in identifying these abscesses.

The most important question concerning such conditions is the method of treatment. In spite of the fact that Thoma, Grieves, and other prominent dentists, have repeatedly demonstrated that these apical abscesses cannot be cured there are a great many dentists who not only disagree with this but attempt to cure them by various medical and electrical agencies. In the recently mentioned work by Grieves is this statement, with which we entirely agree, "One of the gravest mistakes of dentists is the stubborn belief that correct canal filling will cure apical abscesses."

In our own experience, in the early part of our work, we

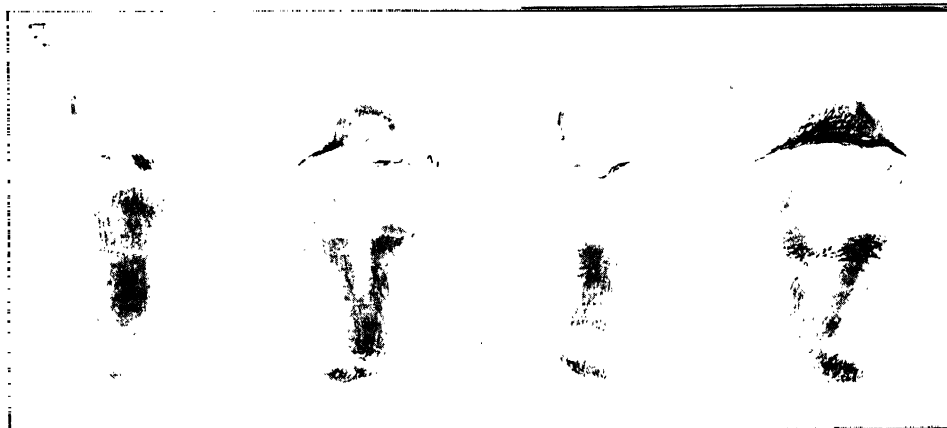
FIG. 8. A. Drawing of a gold-capped or crowned tooth with distinct apical granuloma. Four views of the same tooth.

B. Radiograph of first upper molar with gold cap, and very slight indication of root infection. Also unerupted third molar,

C. Drawing of the same tooth as in B, showing extensive granuloma.

D. Radiograph of a gold-crowned tooth with distinct apical involvement.

E. Drawing of same tooth (D) showing very large apical granuloma (from a case of long standing neurasthenia).



A



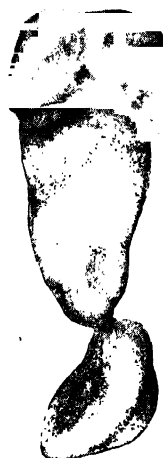
B



C



D



E

(For description, see page 51.)

have had many cases in which gold shell crown molars with apical abscesses have been treated by having the caps removed, root canals thoroughly cleaned out, followed by perfect filling of the root canal. For a while the symptoms disappeared and it looked as if the desired result had been obtained. In the course of a year or two the symptoms recurred and radiograms showed that the apical abscesses had not only persisted but were very much worse than previously. We have had the opportunity to examine the work of men who make a specialty of filling the root canal, but we have found, in spite of the assurance given to the patient that the abscesses were cured and would cause no further trouble, that these teeth, when extracted, were badly infected and cultures showed streptococci in abundance. You should not allow your dentist to fill root canals—if the tooth is dead it should be extracted.

In spite of the various opinions regarding the question of treatment of apical abscesses, there is ample justification in emphasizing the opinion that all teeth with apical abscesses should be extracted. While this opinion may seem radical, it is the only rational viewpoint and we would advise all persons to insist upon this method of procedure if they would preserve their future health and prevent serious mental and physical complications. Indeed, it is more than probable that all devitalized teeth, i.e., those with root canal fillings especially, gold shell crowns, pivot or Richmond crowns, should be extracted whether or not the radiogram shows extensive involvement of the bone; the most progressive dentists today support this viewpoint.¹

We have many examples where, for instance, a devitalized, capped tooth appeared perfectly normal in the radiogram, while upon extraction a very large granuloma was proven to exist. When the radiogram shows extensive necrosis of the

¹ As a result of an agitation against the error of modern dental conservation, certain progressive and conscientious dentists of the country have formed an association known as the American Academy of Applied Dental Science and one of the principal tenets of this organization is that "all dead or devitalized teeth should be extracted." They are opposed to all caps, crowns and pivot teeth, and fixed bridge work, and are particular that their extraction work should be of the highest character and not of a type which will later produce the same condition which caused the patient's trouble originally.

alveolar process or jaw bone it must be remembered that it often has taken many years for this necrosis to occur. Unfortunately, the radiogram does not show the soft granuloma, and where this condition has not had time to produce extensive bone necrosis we can be misled in the belief that the tooth is not infected. Cultures of these teeth have demonstrated that serious infection is present and the clinical evidence, i.e., the patient recovering following the extraction of such teeth, substantiates our view that such teeth should be extracted. From this it must not be inferred that even among the seriously ill patients at the State Hospital at Trenton an unnecessary or, indeed, unusual number of teeth per patient are extracted. The average is now not over five per capita.

DECAYED OR CARIOUS TEETH

Many patients show evidence of serious neglect of their teeth and of course a dentist is not to be blamed for this condition. Teeth with superficial decay can be filled and are not a menace to the patient's health, but when the decay is extensive and when it involves the pulp chamber the tooth is practically dead and extraction is the only course left. In such cases, radiograms will usually reveal apical abscesses and extensive involvement of the bone. (See Fig. 9.)

The cause of carious teeth is still a disputed question. Many dentists claim that diet has a great deal to do with this condition and it is possible that the eating of too much sweet food, such as candy, sugar, etc., may have some remote bearing on the subject. On the other hand, it is certain that infection plays a very important rôle in causing decay. Perhaps the excess of carbohydrates supplies favorable culture media for the growth of bacteria. Very often "bacterial plaques" form on the tooth as the result of the neglect to properly clean them, and decay under these plaques is the usual result.

It has also been shown that anatomical defects in the teeth, frequently found in children, such as roughness and irregularities, favor the production of these plaques and the resulting decay. By proper attention to children's teeth and the removal of these anatomical irregularities by planing, the tooth is made perfectly smooth and decay prevented.

APPARENTLY HEALTHY TEETH WITH PERIODONTITIS

In examples of this type of infection there frequently is no distinct apical abscess as shown by the radiogram. The absence of external decay and the lack of shell crowns, pivots, etc., often leads to the incorrect conclusion that these teeth are normal. A close inspection of the X-ray, however, will show that there is a distinct area surrounding the tooth, indicating that the peridental membrane has been destroyed and that the tooth is extensively infected. This infection evidently comes from the outside of the tooth and works its way down the sides, destroying the membrane surrounding the tooth. (See Fig. 10.)

According to Grieves, a tooth may be invaded by infection without evident decay. When these teeth are extracted we frequently find the presence of a gingival granuloma which is infected tissue, attached to the tooth at about the upper third, and directly under the gum. Often the only indication, aside from the black line adjacent to the tooth shown in the radiogram, is a faint red line in the gum tissue adjacent to the tooth. In most cases pressure on the gum will disclose an exudation which when cultured shows the presence of *staphylococci*.

Frequently the gums are much swollen, purple instead of pink and hard. This condition has been classed as pyorrheal pockets, but no one has called attention to the importance of these gingival granuloma which furnish a large area of absorption into the system through the soft gum tissue. We have many cases on record where the patient's life has been saved in some instances, and his mental condition restored in others, due to radical treatment of these conditions by extraction.

We would cite the following case: In the spring of 1917, a boy, twenty years of age, a patient of Dr. William A. Clark, was admitted to Mercer Hospital, suffering from polyarthritis of a severe type and complicated with a valvular heart lesion. He was anemic, emaciated, and in an extremely nervous condition. An examination of the teeth by the X-ray method showed several apical abscesses. These teeth were extracted. He did not improve and soon left the hospital, and his treat-

ment was considered by the patient as well as ourselves a failure.

Soon after leaving the hospital he became worse. When I saw him, I was convinced that something must be done if his life was to be saved. An examination of the molars showed a condition that I had not seen before. The teeth were milky white, apparently vital and had no fillings or evidence of decay. The gum was swollen and almost covered the crowns of the molars.

The boy protested when extraction of these teeth was proposed because the extraction of the other teeth had not benefited him. I could not give him positive assurance that extracting the eight molars would benefit him, but I told him that nothing else could save him. Finally, his family prevailed upon him to have them out. Four at a time were extracted and the result was remarkable. He began slowly to improve and his pulse subsided from 120 to normal in a few days. His convalescence was rapid and in a few months he was able to resume his former occupation.

In March, 1920, this patient spoke to the writer who did not recognize him until he introduced himself. He had been steadily employed at war work for the past two years and was in a perfectly healthy condition. An examination of the extracted molars confirmed our opinion that they were the cause of the boy's trouble. Each of the eight molars had a large gingival granuloma just below the gums, and cultures gave luxuriant growths of streptococci. The patient's rapid recovery verified the diagnosis of toxemia due to infected molars.

POORLY FILLED TEETH, WITH EVIDENCE OF INFECTION

In examining patients' mouths, we frequently see no bridge work, capped or crowned teeth, but very heavy fillings, many of the teeth having been devitalized. We have found a large proportion of these teeth, especially where the root canals have been filled, either poorly or well, to be infected, and it brings up the question as to how bad a tooth can be before it reaches the point where it should be extracted, or stated better, how much of the tooth can be filled and the tooth still remain healthy. (See Fig. 9.)

If the radiogram is not absolutely clear, if the roots are somewhat hazy and the surrounding bony tissue abnormal looking, we unhesitatingly extract these teeth. In our cases,

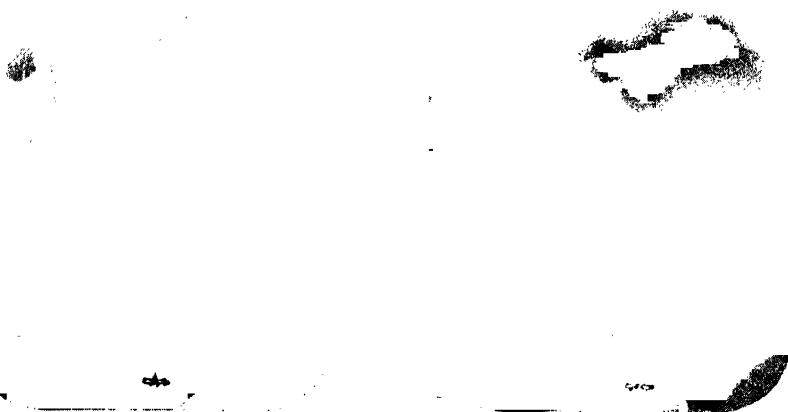


FIG. 9. Poorly filled root canals. Decayed teeth with apical infection and apparently healthy teeth with infection.

at least, we have found them badly infected. It may be that the tooth was not properly filled. I have seen teeth where the fillings were taken out carefully and cultures made from the tissue below and we have found abundant, virulent streptococci. It is a question whether these teeth could have been aseptically filled, if they were already infected. At any rate, if the tooth is at all suspicious, we are of the opinion that it should be extracted and not left as a menace after all foci of infection have been removed.

PYORRHOEA

We class together pyorrhoea and infected teeth and it is especially gratifying to find that Grieves supports our view. Under his heading of sound tooth pulps, diseased by pyorrhoea, he goes into the subject in an exhaustive manner, showing that the pulp disease is induced from the gingiva, and also states that "pyorrhoeal teeth, damaged to the middle third, and swathed in purulency, must be removed." We have followed

the practice where there was any severe disease of the gum, whether it could be classed as pyorrhoea or not, of extracting the teeth.

I have argued with specialists in the treatment of pyorrhoea who claim they can cure the condition and the teeth remain healthy. I do not deny that this may be possible but I would rather take the opinion of Grieves that in these cases the teeth should be extracted. In most of our cases we do not see the typical pyorrhoeal conditions, that is, there is not the extensive pus to be squeezed out of the gums, and I am inclined to think that the pyorrhea, due to amebae, is rather rare in our cases.



FIG. 10 A

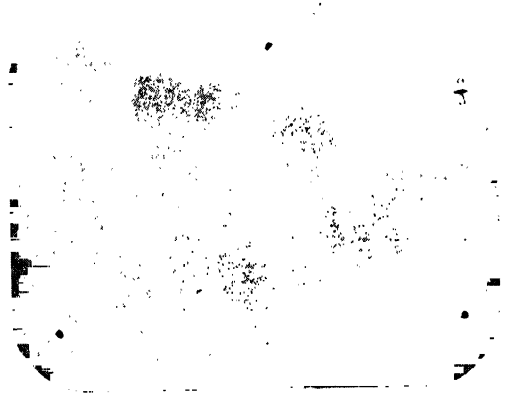


FIG. 10 B

FIG. 10. *Periodontitis.*

A. Drawing of molar with gingival granuloma.

B. Radiograph of same tooth (A) showing separation of periodontal membrane.

What we do find is chronically infected gums, due to streptococcus infection, but, whether this is pyorrhoea or not, we have found that only by extracting the teeth could we obtain results. The emetin treatment of pyorrhoea, which promised so much, has not proven successful and has been abandoned by the best dentists. This is in exact accord with the results obtained from the use of emetin in treating amoebic dysentery, in which it has unfortunately been proved to be a failure.

EXOSTOSIS AND SCLEROSIS OF TEETH

In many cases we find a condition which is not easily described and which is frequently overlooked. We refer especially to the exostosis and sclerosis of the roots of the molars. Frequently these roots are fused and no clear picture can be obtained by the X-ray. Frequently the roots become very large, and often the radiogram is somewhat hazy (Fig. 10). Careful culture of these teeth has shown them to be infected and exostosis and sclerosis is probably due to the irritation of the infection, causing the bony tissue to proliferate. In one case there was a ball-like exostosis of the roots of all the teeth and they were extracted with difficulty. (See Fig. 11.)

CHILDREN'S TEETH

No one who has made an investigation of the subject would dispute the fact that the teeth of the children of this generation are proverbially bad. This has been found by investigation of the teeth of the children in the schools and it certainly is a fact that the abnormal children present even worse conditions. Improper cleaning of the teeth, or lack of cleaning, improper diet, such as excessive sweets, have been blamed for this condition. We admit that dietetic errors and lack of cleanliness may play a part but we do not think that this is the whole cause of the trouble. It is possible, also, that a diet which is confined to soft foods, with not enough hard food, such as crusts and hard bread, might account, to some extent, for this defect.

That the importance of proper care of children's teeth is becoming better known can be seen from the following extracts from the bulletin of the Department of Health, New York, issued January 1, 1921:

"Effect of Dental Decay."

"It is still very little realized by most people that the teeth play a very important part in determining general health. Careful scientific investigations of recent years, however, have shown that uncorrected dental defects in children may seriously injure the growth and development of the body and

greatly lower the child's resistance to communicable disease. From the standpoint of school progress carefully kept records have indicated toothache as one of the most frequent causes of absence from school and that neglected mouth conditions are responsible for a very high percentage of retardation in school work. In addition to these immediate results of dental neglect the X-ray has pointed to diseased teeth as the starting point of many of the so-called degenerative diseases of later life the onset of which might have been delayed or prevented by proper dental attention during childhood."

"In Bridgeport, Conn., where during the last five years special attention has been paid to the operation of dental clinics, reports by the city board of health indicate that there has been a very considerable reduction in the incidence of communicable diseases in that city during the period following the establishment of school dental clinics in the year 1914. During this period diphtheria showed a decrease from 26.6 per cent to 18.7 per cent, measles 20 per cent to 4.4 per cent, and scarlet fever from 14.1 to 0.5 per cent."

"The neglect of the teeth in early life usually means an infected mouth with abscesses at the roots of the teeth which, unless cared for, persist in later life. It may readily be seen that such abscesses may act as reservoirs of infectious material which may enter the blood stream and be carried to the remote parts of the body, frequently causing rheumatism, heart disease, kidney trouble, and other ailments which may materially shorten life. It has been said that *one-fourth of all of the people who die annually in the United States have their life shortened from five to ten years by these so-called degenerative diseases.*"

In many instances the first, or milk teeth, of the children, are badly decayed and infected and in such cases the infection is undoubtedly passed on to the second teeth. We have been closely observing the teeth of the parents of many of our patients with infected teeth and in hardly a single instance do we find them free from evidences of infected teeth, such as bridge work, shell crowns, Richmond crowns, etc. In many instances, after clearing up the patients' mouths, we have had

to take the parents in hand and clear up their mouths as well. Frequently, the parents show no systemic effects of their infection at the time, but in many instances, later on, serious physical conditions have arisen as a result of these infections and they have sought advice in regard to their teeth.

We should like to call attention to the possibility of the transmission of infection from the parents to the children and point out the dangers to which parents with such teeth expose their children. There are many ways in which this infection can be transmitted, especially through close contact of parents and children. Indiscriminate kissing of children, by people with infected teeth, whether parents or not, should be discouraged. The practice of feeding children with the same forks and spoons used at the same time by the parents should not be allowed. This would also apply to nurse maids and nurses caring for children.

It has been determined that tuberculosis is transmitted to the children, not through the medium of heredity, but through contact of the child with tubercular parents, and by the child's habit of putting everything in its mouth, and by other means which are very numerous. There are so many methods by which infection can be transmitted from the adults to children that we are justified in warning those with infected teeth, even though no systemic effects be evident in them at the time, against this danger. In other words, if you desire your children to be free from this infection, the best plan is to see that your own teeth and tonsils are not infected or your mouth swarming with virulent bacteria.

When the first teeth of children are infected and badly decayed, it has been our practice to extract them as I know of no other way by which the infection can be removed. Some authorities hold that the extraction of the first teeth will interfere with the proper alignment of the second teeth, but the advantages of eliminating the infection should far outweigh the dangers which might arise as a result of extraction.

There can be no doubt that infected teeth may develop at an early age and after some years produce sufficient toxic poisoning, as in the case of impacted teeth, to account for the

peculiar and abnormal personalities of these individuals long before a psychosis has developed.

We would conclude, then, that it is necessary not alone that the child should be taught the importance of cleanliness and



FIG. 11. Radiographs of teeth in a case of paresis, showing exostoses or enlargement of the roots, due to infection.

proper diet, but that the parents should be taught the danger of allowing their own teeth to be neglected, for although they have no particular symptoms at the time, they may have badly infected teeth, and be guilty of transmitting infection to the child.

TONSILS

These important and much discussed structures are thought to exert a developmental as well as a protective function in the early life of the child. Like the thymus gland, at puberty these functions cease and they tend to atrophy. In many ways they resemble an ordinary lymphatic gland but the important point is that they contain crypts (Fig. 12). These are blind cavities which extend through the organ and which normally contain cells and food remnants. Thus they furnish an ideal soil and breeding place for the development of bacterial growth. They are apt to be contaminated by the child putting soiled toys, etc., into the mouth and infection may also occur directly from the parents as has been noted in case of the teeth. Disease producing bacteria are able to penetrate the mucous membrane of the

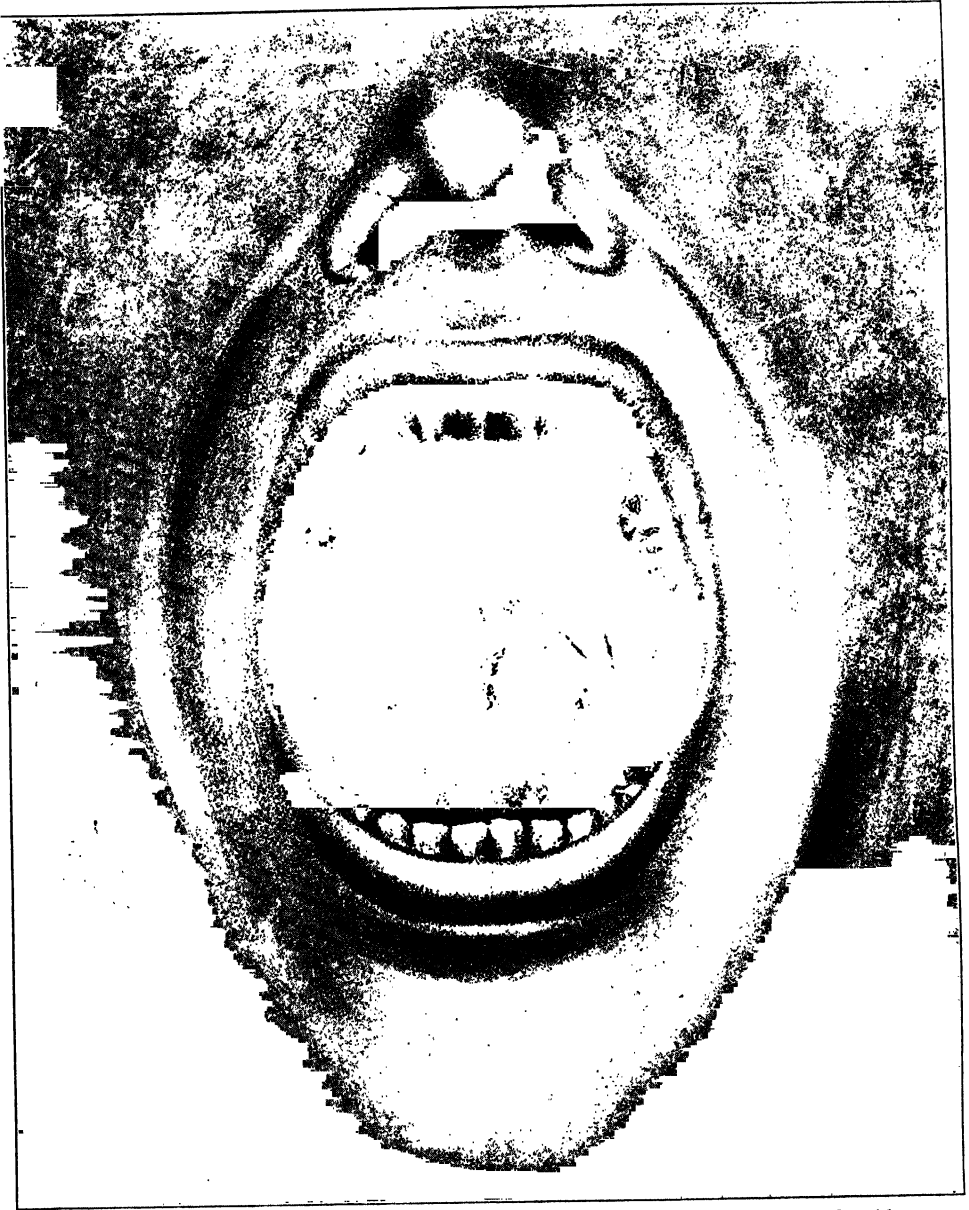


FIG. 12. Drawing of the mouth showing enlarged and infected tonsils (from a case of periodic depression).

tonsils. In whatever way the infection occurs, infected tonsils are to be considered of equal importance with the teeth in producing systemic diseases and mental disorders and are to be removed irrespective of the age of the patient.

SECONDARY FOCI IN STOMACH AND DUODENUM

It has been shown that these harmful micro-organisms, which frequently originate in the teeth and tonsils, do migrate to other parts of the body and set up secondary foci. In some cases, these secondary foci may disappear with the removal of the primary focus. In the large majority of cases, however, the secondary foci have become entrenched so that means have to be used to get rid of them, independent of the elimination of the primary focus.

The stomach and duodenum are very frequently the seat of secondary foci. The infection is conveyed to the stomach, either by means of constant swallowing of infected material from the mouth—teeth and tonsils—or through the lymph or blood circulation, more probably the former. The bacteria invade the stomach wall and appear to interfere with the secretion of hydrochloric acid, so necessary to digestion. Cultures of the stomach contents will reveal the presence of various types of streptococci and frequently of various types of colon bacilli. The chemical examination of stomach contents will show either a very low secretion of hydrochloric acid, or in many cases, its entire absence during the test meal. Frequently, the duodenum is also infected and occasionally the stomach may be normal, the infection being localized in the duodenum. (See Figs. 13 and 14.)

It is believed by many investigators that acute and chronic ulcers of the stomach and duodenum are often the result of this infection. The latter are four times as common as the former. Autogenous vaccines, made from the cultures of the stomach and duodenum, have been frequently used successfully in eliminating the infection with subsequent restoration of the hydrochloric acid and gastric juice to normal.

The small and large bowel may frequently become the seat of secondary infection. In the majority of cases, the infection is limited to some part of the colon or large bowel. There may exist certain abnormalities of this portion of the intestinal tract which predispose to the invasion of the intestinal wall, by streptococci and colon bacilli and other micro-organisms.

Frequently these anatomical variants are congenital and in

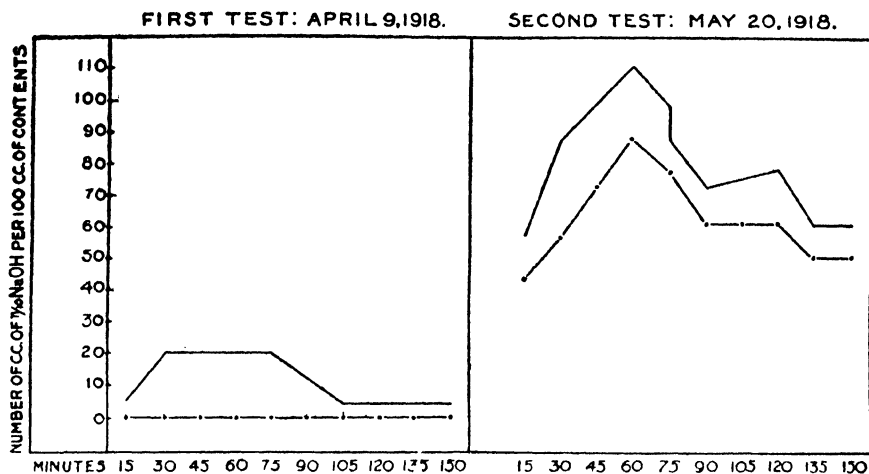


FIG. 13. Two charts showing range of gastric acidity by the Rehfuess fractional method. April 9, there was a total absence or lack of free HCl, and cultures made from the stomach contents gave streptococcus, B. Coli and staphylococcus aureus. After the administration of an autogenous vaccine made from these bacteria, the second test on May 20, 1918, the HCl curve has become normal and cultures were sterile. (This patient recovered after the administration of the autogenous vaccine, from an unclassified psychosis of nine years' duration.)

————— = total acidity
 = free HCl

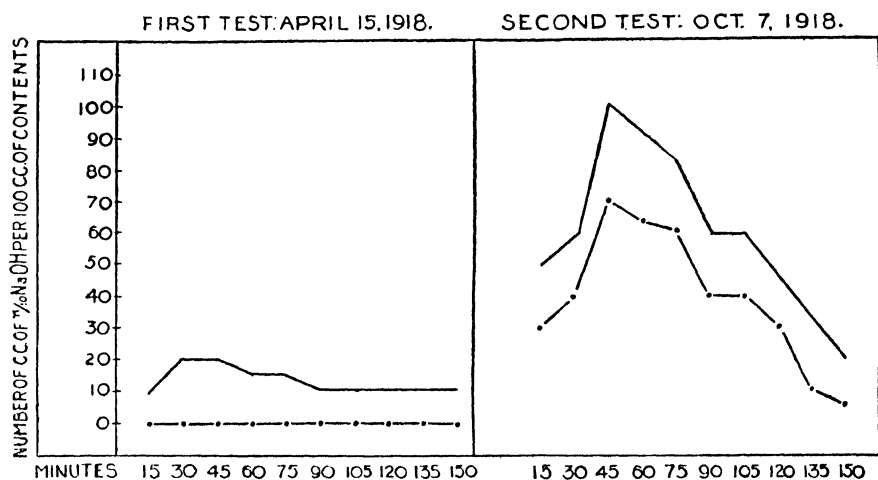


FIG. 14. Similar charts as in FIG. 13, with return of the HCl to normal after administration of the autogenous vaccine of streptococcus and staphylococcus aureus. The cultures from the duodenal contents gave the same type of bacteria. From a case of depression lasting some years, with recovery after vaccine treatment.

————— = total acidity
 = free HCl

some cases the same abnormalities have been found to exist in parent and child. The localized "areas of delay" are, naturally, predisposed to infection, because of the stagnation of the bowel contents at these points, a gravitational disorder. In some cases the colon may have no evident anatomical defects, but the infection may gradually destroy the normal lining and even the muscular coats of the intestinal wall and produce a serious pathological condition. This often causes great irregularity of the bowels and the absorption not only of bacterial toxins, but also of harmful putrefactive material from the bowel contents arising chiefly from the protein foods. On the other hand, in rare instances, all the bowel functions may remain subjectively normal. These considerations call to mind recent investigations regarding the relative importance to us of the stomach and colon. All of us have been brought up to believe that our food is digested largely, at least, in the stomach and that it is a most important organ. As a matter of fact, it has been found, chiefly through indisputable proof, after its removal by surgery, that it is one of the least important organs in the body, for patients often gain much weight with only a fragment of it left. The principal function of the stomach is storage and motility, each easily dispensed with. Digestion is completed in the first part of the small bowel. The stomach is for all the world like a cement mixer often used in the erection of large buildings and just about as necessary. The large bowel is, similarly, for storage and we can dispense with it just as freely as with the stomach.

INFECTION OF LOWER INTESTINAL TRACT

A further consideration of the cause of these intestinal difficulties centers upon gravity and the upright position. We have never become adapted to this position, still paying the penalty, as Shaler remarks, for "getting up on our hind legs." This position forces the bowel contents to run uphill in certain parts of the colon and causes it to work constantly against gravity. This imposes a load for which the organ was not originally devised and for which it has not yet become wholly adapted and which in turn often seriously interferes with the

circulation of the blood. An exhausted organ is of course prone to infection.

These conditions are responsible for large numbers of chronic gastro-intestinal invalids. Their protective symptoms which include pain, vomiting, diarrhoea, etc., and which persist for years are often disabling and the infection finally leads to serious trouble. The lesions found in the colon vary from isolated chronic punched-out ulcerations, to diffuse folliculitis, with serious damage to the entire mucous lining (Figs. 15 and 16). When this infection has persisted for years, the colon may lose its normal appearance and function. We have found, in some cases, only a thin membrane left, in which the muscular and epithelial coats had been entirely destroyed. In these thinned out sacs the putrefying bowel content has been proved by the X-ray to have remained for as much as ten days, pouring toxins, bacteria and all forms of poison into the patient's system. The extensive distensions often found, may be acquired or congenital, or due to both causes. The small bowel is less frequently infected than the large bowel.

In many of our cases, however, we have found extensive infection extending the whole length of the small intestine. Surgical measures have proven successful in eliminating the infection in the colon but it is evident that when the whole intestinal tract is invaded, surgical procedures are unavailable and the infection must be combated by means of vaccines or sera. These are the most powerful adjuncts to surgery and may in the end almost wholly replace it.

The appendix and gall bladder are frequently involved, whether primarily or secondarily is not yet known, and when infected should be removed. The rectum is not an unusual site for infection and in some of our cases chronic ulceration has been found associated, frequently, with infected venous thrombosis, cryptitis, fistula and fissure.

GENITO-URINARY TRACT

The cervix or neck of the uterus has been found to harbor extensive infection which, aside from an unpleasant discharge, produces no marked subjective discomfort to the patient. The

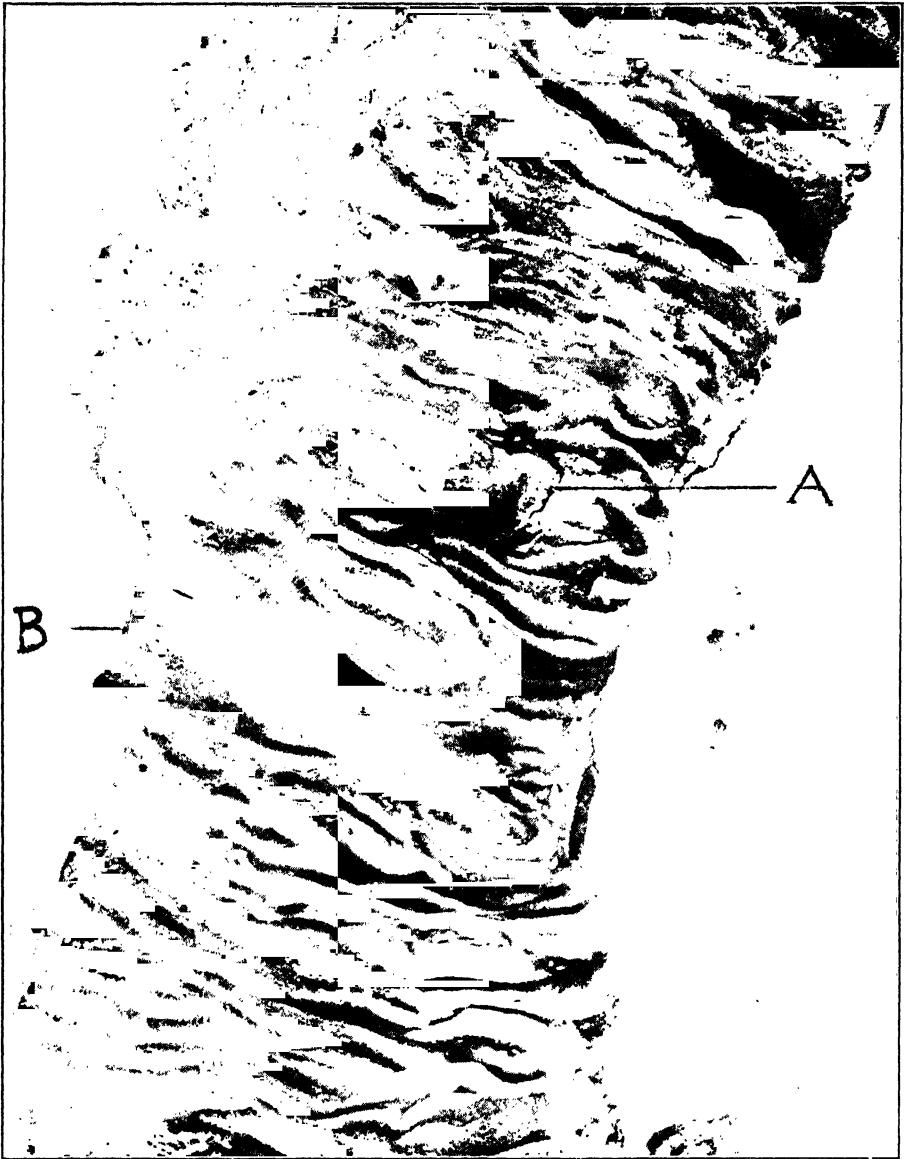


FIG. 15. Photograph of the mucous lining of the colon after resection.

A. Punched out ulceration.

B. Destruction of the rugae or folds of the intestine due to chronic infection.

tubes and ovaries may also be involved and the organism infecting both areas may be either streptococci, or colon bacilli, or both. Emphasis must be laid on the fact that these infections bear no relation whatsoever to venereal disease. As in

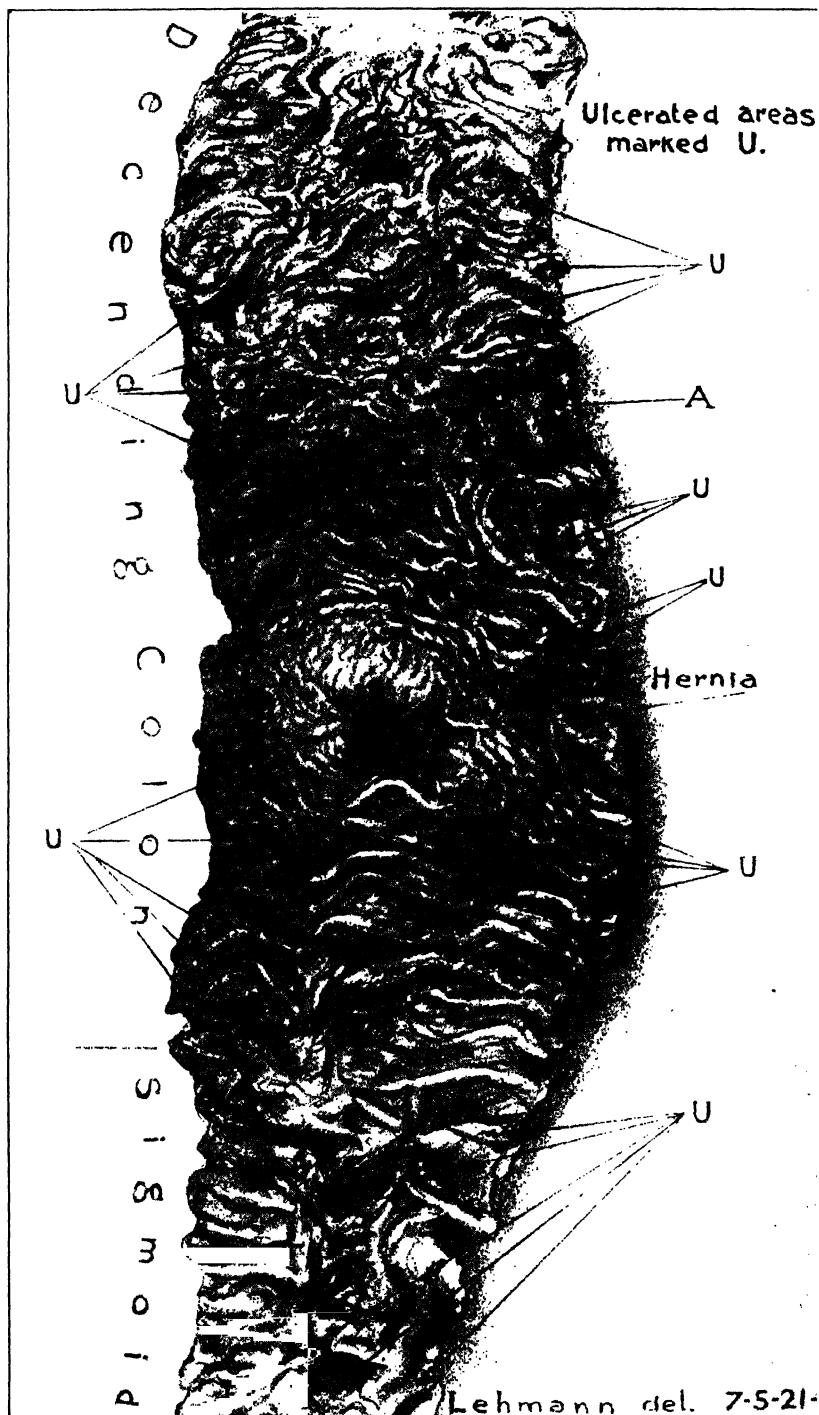


FIG. 16. Drawing of descending colon and sigmoid—showing various types of chronic ulceration. A. Punched out ulcer. U. Ulcerated areas.

the case of localized infections occurring elsewhere in the body, so also in these conditions surgical procedures are necessary to treat the infection. The cervix should, in all cases, be enucleated, according to modern methods. The infected tubes and ovaries are secondary foci from the primary infection in the cervix. Unless too extensive, they will often subside and return to normal after the removal of the primary focus. This takes time, but, as conservation of these organs is of the most vital importance to the patient, both because of the reproductive function and of the very important internal secretion of the ovaries as well, except in extreme conditions these should never be removed, unless it be found unavoidable after a lapse of several months.

In this way, gynecological surgery becomes, as it should be, essentially and primarily protective; safeguarding the ovaries from destructive infection which would ultimately necessitate removal. The uterus is involved in very few cases as this organ seems to present special resistance to chronic infection, although occasionally marked changes occur, probably due to infection, in which cases it is necessary to remove the organ.

In the male, when primary foci of infection have existed for years, we often find infection of the seminal vesicles and less frequently of the prostate gland. It is possible that a previous gonorrheal infection may have lessened the resistance of these areas, allowing invasion by streptococci and colon bacilli, but venereal disease is not as important a factor in the chronic infection of these organs as was generally supposed. Surgical procedures are also necessary here to remove the infection.

SYSTEMIC INVOLVEMENT THROUGH FOCAL INFECTION

The foci of infection in the organs considered above may persist for years and yet produce no very evident effects upon the individual. In many cases they may be considered latent infections capable at any time of becoming actively virulent and migrating to other parts of the body, causing very serious disturbances. If the invading micro-organisms become virulent and are in sufficient number, the tissue reaction is correspondingly severe and the systemic disturbance is apt to be acute. If

the tissues involved are limited in area no anatomical damage may result from the attack and the systemic reaction may be less severe.

Permanent diseased conditions may result from such an invasion and the function of such organs be disturbed. Chronic foci of infection, whether primary or secondary, may serve as a source of constant or intermittent supply of pathogenic micro-organisms of low virulence and of toxins to other areas. These same organisms of low virulence, by repeated invasion of the tissues, may finally cause serious anatomical lesions and disturbances of function.

Thus, acute rheumatic fever is without question due to the invasion of the joints of various types of micro-organisms, originating from the source already described. It is usually due to a form of streptococcus but may be caused by other organisms. One or more joints may be involved and the condition may remain acute or become chronic. There may be also repeated attacks from which the patient recovers, then finally a more severe attack occurs, from which the patient may not recover. As the heart lining is similar to that of the joints it is often attacked by these organisms. This explains the popular expression that "the rheumatism had gone to the heart."

In arthritis deformans, a chronic involvement of the joints, the disease is usually progressive and remedial measures must be used in the early stages. For, while the acute joint conditions may clear up spontaneously, this chronic form goes on to the production of serious anatomical changes in the joints, so that while the removal of the source of infection may stop the pain it will have very little effect in reducing the joint deformity.

Various forms of heart disease, described as endocarditis, or disease of the lining membrane of the heart and valves; myocarditis, or disease of the muscular tissue of the heart; pericarditis, or disease of the sac surrounding the heart, are all the result of the invasion of the heart, usually by streptococcus. It comes from the chronic foci of infection referred to, often the tonsils. In one case we have found the colon bacillus responsible for pericarditis which caused the death of the patient.

The liability of such a serious condition as heart disease developing suddenly, from chronic foci of infection, emphasizes the importance of eliminating all chronic foci of infection from the system.

Nephritis, or as it is commonly called, "Bright's Disease," diseases of the liver, pancreas, bones, muscular rheumatism, chronic neuritis, diseases of the eyes, various skin lesions and other conditions, have been found to be due to chronic infections. Following the removal of such infections many of these conditions disappear, showing that they are in reality the visible symptoms, only, of the invisible and unrecognized focal infections elsewhere in the body.

Disturbances of the endocrin system, or the ductless glands responsible for the internal secretions, are frequently caused, either by direct invasion of bacteria or by toxins, produced by the chronic infection. This is especially true of the thyroid gland and Billings calls attention to many cases where an enlarged thyroid gland, producing serious systemic disturbances, has become normal after the removal of the chronic foci of infection and the systemic disturbances have ceased. If the thyroid gland has become permanently damaged, removal of the infection will not restore the gland to normal, in which event it will be necessary to treat it by surgical measures.

In all of the conditions described above, the disturbance is undoubtedly caused by the invasion of the tissue by micro-organisms or their toxic products. In mental conditions, the result of chronic infection, only in rare cases do the micro-organisms themselves invade the tissues of the brain. The disturbance is produced by the toxin, generated by the bacteria and transmitted to the brain through the blood stream. The mechanism of the development of mental disease is more complicated and the relation of physical causes to the psychoses is more difficult to understand than in the various physical ailments just described, but it will be shown that it also is subject to the great biological laws relating to function and structure.

THE SELECTIVE ACTIVITY OF PATHOGENIC BACTERIA

It has been very difficult to understand why the streptococci, in one individual, will attack the heart and joints; in another individual, the kidneys; in another, the stomach; in still another, the gall bladder, etc. As has been stated, it has been hard to comprehend how a group of organisms, apparently all alike, could cause so many diseased conditions in very diverse organs. Taught to expect specificity in all disorders—a special organism being responsible for the bulk of all known infectious diseases—physicians were, naturally, at a loss to understand such great diversity, both in the character of the lesions and in their distribution, as was noted in the disorders long known to have streptococci associated with their occurrence. For a long time, this prevented the acceptance of these organisms as causative factors.

This erroneous conclusion is now known to have been due to a faulty premise, viz., that because the organisms in question were alike in morphology they were consequently alike in function. There is no better example than this of the decline of the influence of morphological standards in medicine and their replacement by functional or biological criteria. As a matter of fact, the streptococci differ widely and it is not surprising that they may cause a diversity of lesions.

Rosenow, in a long series of experiments, proved that various strains of the streptococcus possessed a selective activity or special affinity for certain tissues. He has demonstrated by animal experimentation that strains of streptococci, taken from the teeth in an individual having a heart lesion, would produce in the majority of instances, a heart lesion in an experimental animal and this holds good for many other conditions. This selective nature of the streptococcus is very important in solving many problems relating to the causation of diseases of obscure origin.

Thus, in mental diseases, the toxins generated by the bacteria, undoubtedly impair the nervous tissue of the brain, in obedience to this law of selective activity, and it is, therefore, important to note that seldom do mental cases have any rheumatic trouble. One case, only, has come under the writer's

observation, in which a psychosis directly followed acute rheumatism and there is but one case in the State Hospital where the mental disease is associated with arthritis deformans. Very few mental cases are associated with primary lesions of the heart and kidneys, although these organs usually become involved in the terminal stages of the disease.

SUMMARY AND CONCLUSIONS

It has been shown that chronic infections may occur, and cause serious damage, without the individual being aware of their presence and the danger lies in this strange fact. In this they differ from the well known acute infections in which the patient, by reason of pus, pain, temperature, and other symptoms, is only too well aware of the presence of infection.

Particular attention should be paid to the teeth and tonsils if chronic infection is to be eliminated at its onset. The individual should insist upon a thorough examination by means of the X-ray, as well as a thorough examination of the mouth and the decision should always be based upon these two factors and never upon one alone. All badly decayed teeth and all dead teeth should be extracted without delay and under no circumstances should these teeth be saved by any methods used in modern dentistry for cosmetic or other effects. Fixed bridge work of every description, gold shell crowns and Richmond crowns, should be eschewed by the individual in every instance, and teeth in need of such work should be extracted, even if the individual has no special systemic symptoms at the time. The aversion for artificial dentures or plates by the people at large, especially in the younger individuals is not justified. Instead of creating the impression of advancing age and as ushering in a period of decline, artificial dentures are in reality the greatest possible safeguards against premature old age. Moreover, with the increasing public demand for properly fitting dental devices, there has come immediate response from the resourceful and ingenious dentists in America. Examples of these are the modern removable bridge and the newer forms of plate adjusted to the soft parts of the mouth, rather than to the bony parts as was the case with the older devices. Ton-

sils once infected, are always a source of danger and should be removed.

It should be distinctly understood that infectious bacteria originally in the teeth, may become disseminated throughout the system and form secondary foci of infection, which will persist after the source in the teeth, tonsils and other regions has been eliminated.

The selective action of the streptococcus and other organisms accounts for the many and diverse symptoms which may result from hidden infection in tonsils, teeth and elsewhere and the development of general systemic diseases in organs like the heart and kidneys. Such systemic involvement may be the result of a direct invasion by the bacteria from other organs remote from the original source or by the transmission of the toxins generated by these bacteria, through the blood stream, as is the case in certain systemic and mental diseases. Do not let your dentist delude you with the statement so often heard that "bad health causes bad teeth" as we know that such a theory is absolutely false, the cart leading the horse. The *bad health* is the result of *bad teeth* and not a cause as many would have us believe.

It is no new theory that infection and toxemia can cause mental disturbances for psychiatrists have, for many years, classified such disturbances under the specific terms "Toxic-infectious psychoses." This diagnosis was, however, limited to a small group of cases in which, from the acute nature of the infection, its presence was readily recognized by the routine examination. We have merely extended this group to include types of mental disorder of a hitherto unknown origin, in which the existing infection, because of its nature, eluded the scrutiny of the physician, was unknown to the patient, and was brought to light only by the newer methods of physical diagnosis.

This should answer any destructive criticism of this work, i.e., that while infection may be present in the psychotic patients it has not yet been proven to cause the psychosis. Fortunately, as we have stated above, infection is a well proven factor and one generally recognized by psychiatrists. Neither does the criticism apply that such infection is very prevalent in the

population at large and the proportion of mental diseases is relatively small. As has been explained, the individual's immunity will protect him, not only from mental symptoms resulting from infection, but from other physical troubles as well just as long as equilibrium is maintained between his susceptibility and the virulence of the bacterial parasite.

The same situation exists in the relation of alcohol to insanity. Many people formerly consumed more or less alcoholic beverages but only a small proportion of the population developed alcoholic psychoses. But no one would deny that alcohol was the cause of the psychosis. And the same may be said of the relation of syphilis to paresis, which develops in only about 4 per cent of the individuals infected with syphilis.

All infected tonsils should be removed. Children's teeth should be properly protected from infection and repeated examinations made to check beginning signs of infection. Impacted and unerupted molars in the adolescent should be extracted to prevent further trouble, either mental or physical. Scrupulous care should be exercised by the parents to prevent infection of their children's teeth by contamination. The same rules should be enforced as are required in fighting tuberculosis. Better still, parents should have all infections in their own mouths eliminated if they wish their children to be healthy.

CHAPTER IV

TYPES OF MENTAL DISORDERS AND THEIR TREATMENT

TOXIC PSYCHOSES

As has been stated, mental diseases are, for convenience, usually divided into the "organic" and "functional" groups, principally because no definite lesions have been found in the brain to account for the symptoms of the so-called functional group. It has been explained why such a classification, based upon this view-point, is untenable today. If we believe that there cannot be function without structure we must also believe that disturbance of function depends upon the disturbance of structure. Perversions of mental adjustment are then to be considered the result of brain lesions rather than the cause of the mental disorder. Therefore, we prefer to regard the "functional" group as toxic.

These comprise the acute conditions, known generally as the manias and melancholias, or as is said today, manic-depressive insanity, and the chronic conditions characterized by brain deterioration and grouped under dementia praecox, including paranoiac conditions, or chronic delusional states. Many of the psychoneuroses, such as hysteria, neurasthenia, and psychasthenia, generally regarded as functional in origin, are now known to respond to the form of treatment herein outlined and frequently to no other. They are, therefore, properly to be placed in the toxic group.

Formerly, the dementia praecox group was always associated with incurability and after such a diagnosis was given very little attempt was made to do anything for the patient. The family was told that the patient should be made as comfortable as possible with the result that he was usually committed to an institution, and, except in rare instances, was confined for the rest of his life.

This large, so-called functional group, comprises at least 50 per cent of the admissions to the state hospitals and at least one-half of this number consists of the dementia praecox group, the individuals of which formerly remained permanently in institutions and constituted one-half of the permanent residents of state hospitals. These residual cases, in a large measure, account for the net annual increase in the insane population. This net annual increase varies according to the number of cases admitted, but has become so large as to constitute a pressing problem in the care of the insane. Any methods which would tend to decrease this yearly increment, aside from any humanitarian aspect of restoration, would lessen materially the economic load which is becoming more and more burdensome to the community.

It is unnecessary to go into any discussion here of the justification of closely differentiating this great "functional" group

6797 First Admissions - New York State Hospitals * 1918.

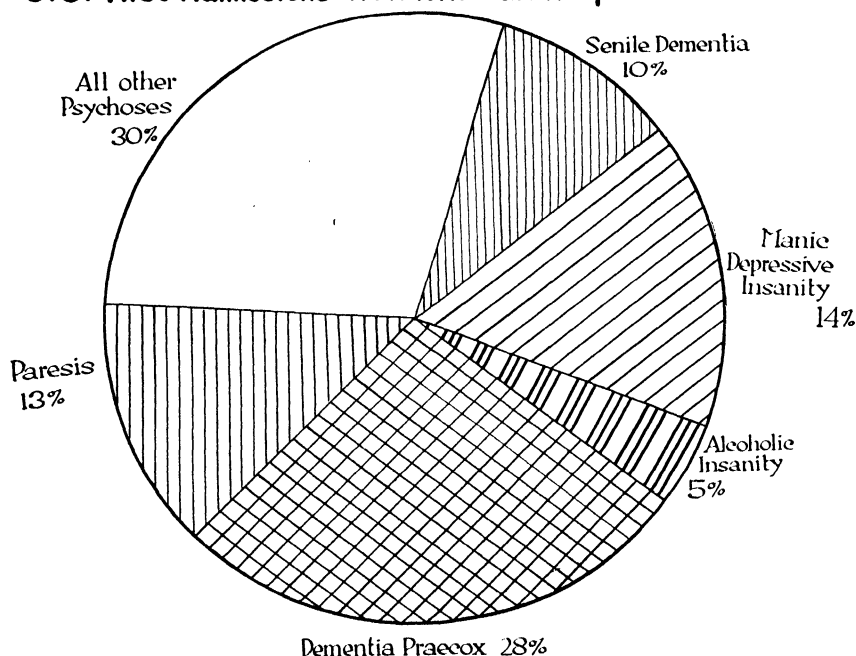


FIG. 17. Chart showing the relative number of types of insanity admitted to the New York State Hospitals in 1918, compiled by Dr. George H. Kirby, Director of the Psychiatric Institute, from a total of 6797 first admissions, and used by his kind permission.

Psychoses 37,352 Cases in New York State Hospitals - June 1918.

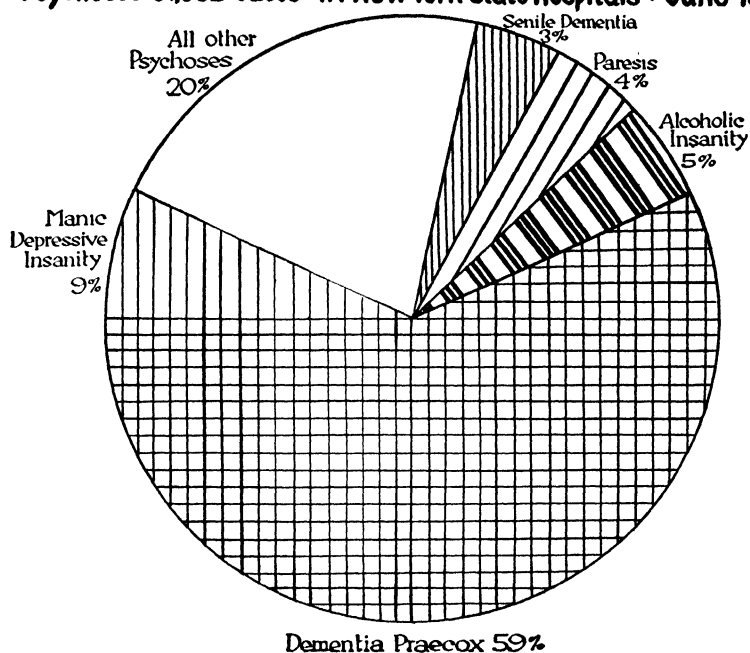


FIG. 18. Chart showing the types of insanity in the New York State Hospitals in a population of 37,352 patients on the first of June, 1918, prepared by Dr. George H. Kirby, and used by his kind permission. It will be seen that more than half of the insane population in these hospitals is composed of the dementia praecox group, or the chronic types.

into distinct entities. It is true that certain cases of dementia praecox can be diagnosed in the incipient stages and a bad prognosis given, and certain types of the acute psychoses can also be easily diagnosed. It is sufficient for the purpose of this work to recognize acute and chronic mental conditions and not to burden the reader with complicated differentiations. When such factors as alcohol, syphilis, arteriosclerosis and senility can be eliminated, which formerly comprised the organic group, we still have this large balance, constituting 50 per cent of our admissions, classed as "functional." (See Figs. 17-18.)

While the course and termination of the various types in this class may differ materially, it has been found that the causative factors are the same. In one type, hereditary influences may be more prominent, in another the psychogenic factors, but in the entire class we have found that the presence of chronic in-

fection and resulting toxemia is the constant and most important factor. In this "functional" group, now classed as toxic, the spontaneous recovery rate was only 37 per cent for the decade prior to 1918. Since then and as a result of instituting the detoxication treatment, the rate has reached 77 per cent.

An explanation of the chronicity, or the tendency toward incurability, may be found in the varying susceptibility of the individual to infection as well as in the character, the severity, and extent of such an infection. The constitutional reaction, inherent in the individual, towards these various factors, is distinctive and specific varying with the patient's physical condition. These elements are evident in all chronic infectious diseases and are not limited to abnormal mental conditions.

It can be shown, no matter what the hereditary influence has been, or what the environmental difficulties to which the patient has been subjected, that there are factors in the physical condition of the patient which should be eliminated, if the toxic process is to be arrested and the patient restored to normal. This change in mental and physical conditions, resulting from the process of surgical and medical detoxication of the individual, is to be described as an *arrest* rather than a *cure*, just as is customary in describing the conditions of patients recovered from tuberculosis or any other chronic infectious disease.

PSYCHOLOGICAL PHENOMENA

In spite of the tremendous amount of work which has been accomplished in the field of psychological research it must be evident from statistical studies that very little benefit to the patient has accrued by reason of such work. The recovery rate has decreased rather than increased during the last twenty-five years, due possibly to the over-crowding of the hospitals and to lack of ordinary sanitary and hygienic surroundings, so necessary to the health of the patient. Psychological investigations, while offering elaborate and helpful explanations and leading us to a better understanding of the nature of the psychosis, have failed to offer any explanation as to their cause and development.

The attempt to find a logical sequence in the psychological

phenomena and to limit the study of the pathological mental condition entirely to the psychological field has been unsuccessful and has led to the error of disregarding or discarding all anatomical and physiological factors, either somatic or cerebral, as the case may be. The later conception of the Freudian school, regarding the subconscious and disturbing elements, which may persist in our minds and finally come to the surface, while very interesting as a hypothesis, has led nowhere in the successful treatment of patients having pronounced mental disorders.

A systematic and thorough study of the mental phenomena by any psychological method which will lead to a clear understanding is always to be encouraged, but, to limit the search for the causative factors exclusively to the psychological field is out of accord with the spirit of modern medicine and hence unsound. It is only by examining the patient as a whole and subjecting him to a most careful examination, both physical and mental, that one can hope to succeed in finding the causes of the mental disturbance. These are often of a physical nature and the psychological phenomena may be merely the result of the somatic pathology.

It is naturally in this large field of the so-called functional class that the need for a better understanding of the causative factors has become imperative. Here, as in every other department of modern medicine, possibly even more so, the crying need is for prevention far more than the relief of the individual patient and prevention cannot be thought of until causation is known.

PARESIS

Paresis, commonly known as "softening of the brain," is a disease in which the cause is definitely known and in which successful treatment and prevention has been made possible by reason of this knowledge. For years it was considered a "mental disease," the result of over-work and mental strain, but the fact of the existence of definite physical signs led to a further investigation of its nature. After years of investigation it was definitely determined that the principal cause of

paresis is syphilis, that the germs of syphilis actually invaded the nervous system and that the resulting disease was determined by the destruction of the nerve cells and fibres, whether in the spinal cord or brain tissue. Although for years there was much skepticism regarding this theory, the perfection of laboratory methods has enabled us to demonstrate the presence of active syphilis in every case and today no one will deny that the cause of paresis is known. Other forms of infection may be co-existent but the main cause is syphilis.

Fortunately, only a small percentage of individuals, who contract syphilis, develop paresis, namely about 4 per cent. Formerly, syphilis was considered cured after years of treatment and the disappearance of all signs of the disease, but here, as in all other chronic infectious diseases what was thought to be a "cure" proved only to be an arrest and that, in spite of the apparent "cure," in the course of time, sometimes as long as twenty years, paresis would develop. Hence, it was difficult to trace the relation of syphilis to paresis until it was demonstrated that the germs were actually in the brain tissue itself and were the direct cause of the disease.

The mental symptoms were, in certain cases, characteristic of the disease, and in the majority of cases a diagnosis could be made easily, especially in the later stages. In the early stages, however, the mental symptoms were not so pronounced and often errors in diagnosis occurred. The introduction of the method of lumbar puncture by means of which the spinal fluid could be withdrawn for examination, microscopic and chemical, offered a diagnostic method which was accurate and reliable, often long before the development of characteristic and distinguishing nervous symptoms.

The changes in the spinal fluid which were found to occur in paresis were diagnostic for the disease and did not occur in other conditions, so a positive diagnosis, in doubtful and early cases, and corrective treatment, at a time when it would be effective, both became possible. Moreover, examination of the spinal fluid furnished conclusive evidence in determining the presence or absence of involvement of the nervous system in the acute stages of syphilis, thus indicating the necessity for

further treatment in such cases as had been erroneously considered cured.

Paresis, therefore, is nothing more than a late symptom of syphilis and is theoretically a preventable disorder, for if syphilis could be prevented there would be no paresis. We know that syphilis can be prevented, largely through education of the youth as to the danger of sexual immorality and promiscuous sexual intercourse. When the disease is acquired, then prompt and efficient treatment should be sought and carried out by specialized, reputable physicians. This means that in every case the spinal fluid must be examined to eliminate possible involvement of the nervous system. If it, too, has been invaded then the proper treatment must be instituted to eradicate the germs from this field.

There is a possibility of a cure in the very early stages of paresis, but the greater the interval between the onset of symptoms and treatment the lesser is the outlook for permanent arrest and the patient should continue treatment until assured by the physician that every test for the disorder has been negative for a long time.

Paresis was formerly considered incurable and the patient usually died within three years of the onset of the symptoms. In the last few years, however, a method of treatment has been developed and has been used successfully in a few hospitals in the early stages of the disease and before very extensive and permanent damage has been done to the brain tissue. This treatment consists of introducing into the spinal canal, or better, the ventricles of the brain, the patient's blood serum prepared after he has been treated by salvarsan, more properly called Arsphenamine, an arsenic preparation, capable of destroying the minute organism which causes syphilis much as quinine destroys the organism which causes malaria. This treatment, however, must be continued for a long period of time before the germs are eradicated from the brain and surrounding tissues and to be effective it must be begun in the early stages of the disease. Another very important step in the treatment of paresis consists in eliminating all other types of chronic focal infection wherever found. The patient with

paresis should be subjected to the same routine examination and treatment recommended for chronic infections before the best results can be obtained.

PSYCHOSES DUE TO ALCOHOL

Alcoholic insanity formerly accounted for over 20 per cent of the male admissions to many state hospitals in this country. With the advent of prohibition this ratio has been materially reduced, even with the present lax enforcement of the laws. In the State Hospital at Trenton the reduction has been from 21 per cent to 7 per cent in the last year. While there is considerable drinking it is evidently not done by those who formerly filled our hospitals. (See Fig. 19.)

If prohibition really becomes effectual there can be no doubt that alcoholic insanity will be a thing of the past and there is every reason to believe that with it the pernicious social factors, the ethical disorders and physical diseases which actually seemed to hatch and grow fat in the bad beverages of the old saloons will have forever passed away. This at once presents the abstract problem as to the justice of curtailing the personal freedom of action of the individuals of the highest type who are not jeopardized by having free access to alcohol, for the protection of the less fortunate congenitally defective class to whom free alcohol has been a menace. One answer may be drawn from the biological evidence, already noted, that human social evolution has outrun all other forms of progress. This limitation of personal freedom is merely one expression of the great force which tends to protect the masses at the expense of the individual and which in sweeping away the saloon has lifted the heaviest yoke from the neck of this vast mass of human defectives. These, it will be remembered, constituted Bismark's famous "Kanonenfutter" and even in prehistoric times they constituted the great bulk of primitive society. The ratio of officers to privates was fixed years ago when the really fit seized command by virtue of superior intelligence. That ratio remains about 5 to 95, as is shown by the fact that in the present army five men still control one hundred. This helps one to realize that human effectives constitute today only about

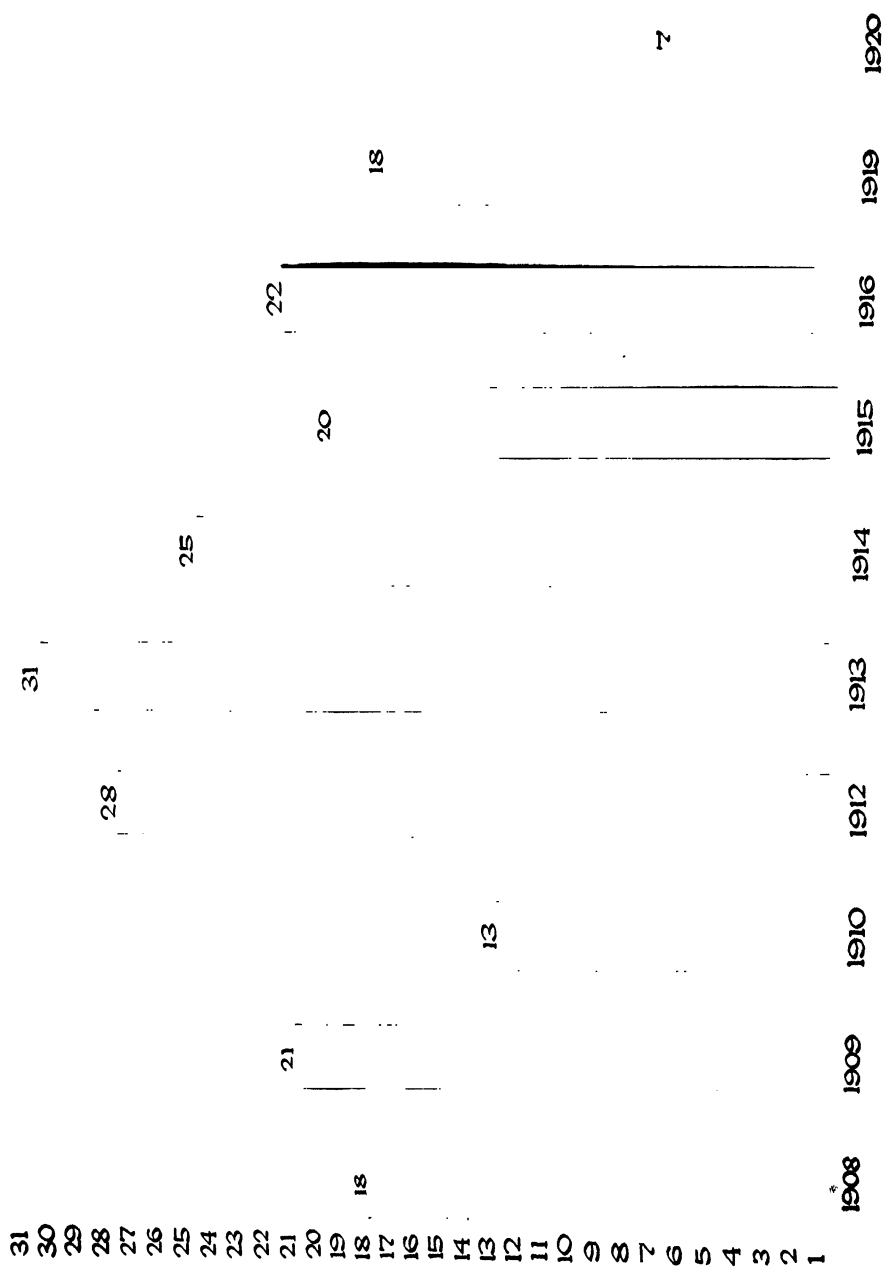


FIG. 19. Table showing percentage of male alcoholic admissions total male admissions, 1908-1916, average, 21 per cent. Alcoholic admissions, 1920, reduced to 7 per cent.

5 per cent of society, the remainder being utterly dependent upon this small group both for protection and for progress. It emphasizes also the ancient maxim "noblesse oblige," and indicates the responsibilities of this small group.

The other answer as to the ethics of prohibition is based on practical considerations, in proportion as the alcoholic wards are empty the homes are filled and happy. The use and even the abuse of alcoholic beverages did by no means always produce psychoses, but the effect on the individual in impairing his moral and ethical sense led to a subversion of his normal character so that his actions in many instances were far worse than those of an insane man. Thus, prohibition has solved for us the problem of alcoholic insanity and has lifted a heavy burden from the community as well as from the families of those who were alcoholics.

THE "NERVOUS" AND "NEUROTIC" INDIVIDUAL

Closely related to the psychotic, these unfortunates are perhaps more misunderstood than any other class of patients. Improperly diagnosed upon subjective symptoms alone, they go from physician to physician always regarded as "pests" and their complaints as unworthy of consideration. Most of them have been told over and over again that their troubles were "imaginary" or "in their heads," that they had "nervous dyspepsia" or, more recently, that they had a "dropped stomach" or "nervous heart" or that they had "uric acid poisoning." Dosed with drugs and dieted to a point of emaciation, the symptoms persisting, they have been ordered to the country or to travel afar. This unfortunate method of treatment has arisen through no fault of the profession, there being in most cases no definite evidence of organic trouble on casual investigation. The modern methods of examination, now aptly described as a "diagnostic survey," and practised in such great medical centers as Johns Hopkins, under Lewellys Barker, and at the Mayo Clinic, have rapidly raised the ratio of findings of physical causes. At the latter place, over eight years ago, J. W. Draper summarized the analysis of seven hundred and fifty cases all diagnosed as "neurasthenics" or "neurotics,"

with the result that, at that time even, 48 per cent were found to have had a physical basis for their symptoms which was recognized and removed in the clinic with consequent arrest of the symptoms. Of the remaining 52 per cent, resulting from the then inadequate methods of diagnosis, Mayo said with prophetic insight, "They are all due to a physical cause, only we do not yet know enough to recognize it. Ten years from now 60 per cent will be diagnosed; twenty-five years from now 70 per cent, and a century or less from now, we shall be able to find and remove the cause in over 90 per cent." This was the correct vision of a practical idealist and its result is seen in the remarkable development of the Mayo Foundation.

There has come a great change in the attitude of the profession toward the patient, due largely to the recognition that, if searched for, a cause can be found for his seemingly foolish complaints. Physicians have found out that they were the fools rather than the patients, to the great benefit of all concerned. When we think of the continued suffering due to failure to recognize the underlying causes of these "neuroses" we can but rejoice in the modern development of diagnostic methods which goes far to make such mistakes a thing of the past. This is in no sense a criticism of the earlier work which failed only because of inadequate knowledge. Criticism will be justified, however, if the modern methods of diagnosis and treatment are withheld, not alone in this group but in the psychotic group as well. It is more than a coincidence, probably, that many of these truths were recognized first by such men as William Mayo, Robert T. Morris, J. W. Draper and others, who were able to confirm their abstract researches and theories by practical demonstration in the operating room. They found in these so-called psychasthenic, neurotic, or psychotic patients, visceral and other lesions which are now known to stand in direct causal relation to the subjective and often vague symptoms.

During the past twenty years many diseases, formerly considered purely medical and of unknown origin, have been proven by surgery or otherwise to be of known and often preventable origin. Through the closer association and coöper-

ation of highly developed special workers in progressive medicine we are on the threshold of developments of the very greatest importance in the extension of this new knowledge in the field of psychiatry and neurology.

On every hand there is now abundant proof that so many neurotic cases are due to physical causes that all should be subjected to a thorough diagnostic survey by modern methods of examination. The following case is reported to show the relation of the toxic factors to the neurosis. A successful business man, married, age 28, and previously healthy, but under considerable financial strain, went abroad to visit his old home in 1912. While on the boat he developed obsessions of a peculiar character, whenever he saw any paint, especially green paint, usually in the toilet, he imagined that he had wrapped this paint up and sent it back to his home in order to poison the children of certain friends. He knew he had done nothing of the kind, but the obsession persisted. After spending a few weeks abroad he returned and then consulted the writer. At that time the obsessions were very vague and weak and soon disappeared without any special treatment, except the reassurance that there was nothing for him to be alarmed about.

He had no further trouble until the Fall of 1915, when he again went abroad to see his father who was dying of cancer. After he had been a few days on the boat, the same obsessions again developed, but this time much stronger and could not be overcome. He made himself a nuisance by asking the other passengers if they had seen him wrap up the paint and send it back. On being assured that he had done no such thing, he would be satisfied for a short time, but would soon ask the same questions, so that he soon began to be shunned by the other passengers. He remained abroad but a short time and upon his return he again consulted the writer. This time the obsessions instead of fading away gradually became worse. He could not attend to business, and he sought the writer two or three times for assurance that he had done nothing. He had perfect insight into his obsession; knew when talking to the physician that it was foolish, but as soon as he left the office they would appear stronger than ever. He was afraid also

that because of his sending this paint to the children and causing their death he would later be charged with murder and convicted. He was sent to the Mercer General Hospital on Oct. 8, 1915, in order to try out the rest treatment and isolation, but here he developed other obsessions,—for example, that he had put paris green in the butter that was left on his plate, and that this was given by his direction to children and caused their death. He became worse at the hospital, could not sleep and remained only three days. Following this it was necessary for the writer to see him twice and often three times a day. Usually a final visit had to be made at night at his home, before he could be made to go to sleep. He always had his wife present during the doctor's visit so that she could reassure him later that the doctor had said he had not done these things. All forms of psychotherapy were tried, psychoanalysis, hypnotism, etc., without effect. It seemed that the more the writer assured him that he had done nothing the stronger the obsessions would become. It would be necessary to repeat to him over and over that he had not done these things and that nothing was going to happen to him. Finally one night the writer's patience, after months of such visits, became exhausted and he refused to tell him again that he had done nothing, and left him. He did not return for some weeks, but when he did the obsessions were much worse. Besides this he was beginning to have auditory hallucinations. He imagined that his children were accusing him of these acts. With all these symptoms he still had good insight as long as his physician told him nothing was wrong. There was nothing especially abnormal in his physical condition, although he was poorly nourished. For over a year he was unable to care for his business and was constantly under the influence of these obsessions.

His blood was examined by various methods. The Abderhalden tests for disturbances of the ductless glands were negative, but the fixation test for streptococci was positive. The writer then had his infected tonsils removed and his infected teeth extracted. In a very short time all his symptoms disappeared and since the fall of 1916, after a year's misery, he re-

covered and has had no return of these symptoms since. He has conducted his business successfully, since then. If he had not received relief it would have been necessary to send him to the State Hospital.

A married woman, age 44, accomplished, previously healthy, suddenly, in February 1918, developed severe attacks of dizziness and vertigo, so that it was impossible for her to raise her head from the bed. She had suffered from habitual constipation since girlhood, which had gradually become worse, and during this attack of vertigo, there was much distention of the abdomen and considerable pain. She was admitted to Mercer Hospital, Trenton, in February, 1918, and after having her teeth X-rayed, all of the upper teeth and the molars and bicuspsids of the lower jaw were extracted, but with no apparent benefit. Her dizziness was so severe that she was confined to bed and relief was obtained only when lying flat upon her back. She remained in the hospital about one month and then returned home, but in April, because of a severe endometritis the uterus was dilated and curetted, but the dizziness persisted. There was partial suppression of urine for some weeks, but this gradually improved and culture of the urine showed streptococci and colon bacilli. The stomach was examined by the Rehfuess fractional method and colon bacilli with a very low hydrochloric acid content was found. Auto-genous vaccines were prepared and given but with no apparent results. In the fall of 1918 her tonsils were removed, and for two months following this operation there was an entire cessation of all dizziness and peculiar head sensations, but after that the dizziness returned. In the spring of 1920, radiographic studies of the gastro-intestinal tract revealed an enormously distended descending colon and an extensive resection or removal of the colon of the left side was done. She made a good surgical recovery and soon after this her headaches, dizziness and vertigo disappeared and now for over a year there have been no symptoms and she is entirely normal in every way.

THE TREATMENT OF TOXIC PSYCHOSES

DETOXICATION OF THE PSYCHOTIC PATIENT

If, as has been intimated, mental disorders are the result of chronic infection, often augmented by mental factors, then our treatment should consist of eliminating as many of these factors as may be possible. The patient's environment should be changed as soon as convenient and, by all means, long before pronounced disorders of conduct render confinement necessary. The best place for such treatment is in the psychopathic wards of general hospitals or well-equipped psychopathic hospitals.

In either case, there should be facilities for investigating abnormal conditions which may exist anywhere in the individual. The patient should be subjected to a diagnostic investigation which would reveal any pathological condition, either in the brain or in any other organs of the body. In the early stages of any psychosis there is usually a distinct realization, on the part of the patient, that something is wrong with him,—he may have persistent headaches, peculiar sensations in the body or head, difficulty in thinking and of concentration, and inability properly to perform his duties. During this period, the patient will go willingly to a hospital, especially when assured that the mental difficulties may be the result of some physical disorder.

The practice of ordering patients, at this stage of the disease, to give up work, change their environment, or go to live on a farm, or travel extensively, is beneficial only in a very few instances. Prolonged rest in bed as in tuberculosis must be insisted upon. It is a weak evasion of our duty not to hunt for the cause. The mental condition often becomes worse through the loss of valuable time and a lack of recognition of the fundamental causes indicated in these lectures. It is true that a certain number of patients will spontaneously recover, and, temporarily, at least, develop sufficient immunity to control their infection, but in the majority of cases when the patient resumes life's burden, the trouble is apt to recur, and usually, the problem of relief becomes more difficult with each succeeding attack.

This is especially true in young adults where the first symp-

toms are misinterpreted both by the family and the physician, being ascribed to "peculiarities" of the individual. A distinct change in the disposition,—a tendency of the person to become irritable, morose, and seclusive,—should be sufficient evidence for a thorough physical investigation of that individual, and as a result, in many cases, the cause can be found and removed and a serious mental breakdown later on averted. These types, with an insidious onset, extending over years and progressing slowly, are the very ones that tend to become chronic and in which often, when treatment is at last started, the damage is so far advanced that all effort is unavailing.

In other types, especially those with maniacal excitement, the attacks come on very suddenly, often the case in psychoses following childbirth, and it is necessary to confine the patient in a hospital at once. This type furnishes a large number of spontaneous recoveries, but unfortunately, many of them recur later on. The fact that they recover spontaneously does not invalidate the theory that infection may be the cause of the trouble, as explained elsewhere.

It is possible, as has been stated, for the patient to develop immunity to the infection and so spontaneously to recover, but any unusual condition, whether mental or physical, may break down the immunity with resulting recurrence of the mental trouble. Even some of the cases with very acute onset do not recover spontaneously and if untreated physically the patients remain permanently in the hospital. In reviewing over six hundred of these cases, it was found that only 84% of the patients presenting symptoms of acute mental disorders, usually considered recoverable (manic-depressive insanity), recover spontaneously from these attacks and that recurrence is frequent. If thoroughly detoxicated, however, in the early stages of the disorder, practically all of this entire group will be arrested, recurrences being extremely rare. When this occurs it has been found that the work of detoxication has been incomplete, and further examination will reveal the fact that there are foci of infection remaining. If the treatment is not instituted early, the symptoms having lasted two years or over, in the average case we have found that no matter how thorough

the detoxication, whether in the acute psychoses (manic-depressive insanity) or the chronic types (dementia praecox) little result can be expected from such treatment. This is exactly analogous to the situation in other fields of medicine, i.e., arthritis, cardiac lesions, etc., where the tissue changes have gone beyond the point of repair.

The essential point, which we wish to emphasize, is that patients should be placed under physical treatment as soon as any unusual symptoms appear—no matter how trivial they seem to the parents or relatives—and the only place where such treatment can be given successfully is in a well equipped hospital.

METHODS USED IN MAKING A DIAGNOSTIC SURVEY

As we are dealing, to a large extent, with hidden infections of which the patient does not complain, it is evident that the ordinary casual physical examination will fail to reveal these foci. Our failures in the past to recognize these hidden infections have been responsible for the unsuccessful attempts to benefit the patient who did not recover spontaneously, and to prevent recurrences. From our knowledge gained in the last three years and the results obtained from applying this knowledge, we should be culpable if we failed to search for every hidden focus of infection and to adopt measures to eradicate it.

Every patient should have the teeth radiographed as soon as possible after admission and a thorough inspection should be made by a competent dentist in conjunction with X-ray findings. As soon as possible all infected teeth should be removed. Mere extraction alone, especially if there is extensive involvement of the alveolar process, will not, in itself, eradicate the infection. A thorough curettment of the socket should be done in every case and even then all necrotic bone cannot be removed. The safest method to use is what is known as the Novisky method of surgical removal.

By this method, the tooth and its cavity, are opened for inspection and the infected area then becomes visible. In the old method of extraction it was necessary to work in the dark and many abscesses and other areas of infection were left. In

some of our patients, where the teeth had been extracted some time before and we had been confident that all infection had been removed, when radiographed again, we have been surprised to find evidences of necrotic areas. When these regions were opened up and the infection removed, the patient improved immediately.

The necessity for a thorough elimination of the dental infection is self-evident. If this is not done, physicians will have the unfortunate experience,—as we have had in some cases,—of a return of the mental symptoms because some infection was overlooked. One case in particular illustrates the necessity for a thorough and complete removal of all dental infection. A young married woman, age 34, suddenly developed a manicacal attack eight months after influenza and was admitted to the State Hospital at Trenton, July 5, 1919. The infected teeth were extracted and infected tonsils removed, but with no relief of the mental symptoms. In October 1919 the infected colon was resected and the infected gall bladder removed. She rapidly recovered and was discharged December 7, 1919. She remained at home ten months when the mental symptoms recurred and she was readmitted to the hospital October 5, 1920. She had very vivid auditory hallucinations and was quite exhilarated. A thorough examination of the teeth revealed the fact that we had neglected to extract all those infected. When this was done her hallucinations disappeared in less than a week. Many patients have exhibited the same reaction.

In our experience we have found it necessary to remove all devitalized teeth whether the X-rays show infection or not. These dead teeth, if allowed to remain, are a menace to the patient's health and if not seriously infected at the time, the chances are that they will become so later on.

It is always necessary to radiograph the alveolar processes in patients who are toothless and are wearing full upper and lower plates. It is possible that a portion of the roots of some of these teeth may have been overlooked or that the necrotic area was so great that extracting the teeth did not remove all the infection. Both of these conditions would be revealed by

a radiogram. It is possible even for an elderly patient to have an impacted or unerupted molar, although all the other teeth have been extracted. This has occurred in three of our patients who were apparently toothless.

TONSILS

The tonsils are the next area in point of importance in the investigation. Inspection of the throat will frequently reveal enlarged and inflamed tonsils from which pus can be expressed on pressure. In many cases the infection is not evident from a casual examination but all throats showing purplish red pillars are suspicious. The tonsils may be small and buried and it is only by getting back of them with an instrument that infection can be demonstrated. If in doubt, the crypts of the tonsils may be cultured and the presence or absence of streptococci determined in this way. Occasionally the colon bacillus is unexpectedly met with. The highest authorities agree that infected tonsils should be removed, no matter what the age of the patient unless the physical condition is so very grave that any operation would be too great a shock.

The old idea, held by many physicians, that it was dangerous to remove the tonsils in an adult, has been found to be unjustified and a serious error. Barring extraordinary conditions infected tonsils should be removed. Such conditions occur very infrequently.

Some of our most successful cases occurred in adults who had failed to respond to other methods but who finally recovered after the removal of the tonsils. In about 85 per cent of toxic psychoses we have found the tonsils infected and often they have been considered normal on the first examination. When, however, the patient failed to recover, the opinion had to be reversed, and after tonsillectomy the patient recovered.

It is extremely easy to overlook an infected tonsil, especially when small and buried. Such tonsils often appear normal on the outside, even after removal, but they have been found to contain a hidden abscess. Frequent attacks of tonsillitis or quinsy sore throat invariably leave behind a permanent infection which cannot be removed except by operation. In many

cases, however, there is an absence of history of any previous tonsillitis, although the tonsils may be infected and producing serious systemic conditions. In case of doubt, cultures, made from the crypts, may be necessary to reach a final decision. (See Fig. 12.)

GASTRO-INTESTINAL TRACT

The stomach contents should be examined in every case by means of the Rehfuß fractional method. This test is as follows: Fifteen minutes after a test meal of two pieces of toast and a cup of unsweetened tea, the Rehfuß duodenal tube is swallowed and by means of a syringe attached to the tube some of the contents is withdrawn every fifteen minutes. Part of this is used for chemical analysis and another part put in culture tubes of bouillon to determine the bacterial content.

In the severely affected stomachs there will be found an absence of hydrochloric acid, which condition is always associated with the presence of bacteria of the streptococcus and colon bacillus groups, either alone or in combination. In many patients, accompanying these severe disturbances of the stomach, as revealed by the examination of its contents, there may be an absence of subjective symptoms; in others severe indigestion, extending over a long period of time.

These conditions have been successfully treated by Rehfuß and other gastro-enterologists, as well as by ourselves, by autogenous vaccines made from the bacteria found. In practically all of the cases, after thorough treatment by the vaccines, a re-examination will show a normal hydrochloric acid content, and cultures of the stomach contents will be sterile. If all infection in the mouth has not been thoroughly eradicated there may be a return of the gastric disorder and with it the mental symptoms are apt to recur.

In a certain proportion of cases, the duodenum, the next link in the chain of gastro-intestinal infection, is also infected.

In some cases the stomach may be normal and the infection entirely in the duodenum but, as a rule, both are involved. Only occasionally do we find the presence of duodenal ulcers in our cases. The lesion seems to be limited to chronic diffuse

infection of the walls of the organ. We have found very little improvement from diet or medication in such cases as we have described. The autogenous vaccine seems to be the best method of restoring the stomach and duodenum to normal conditions. It is useless to try to improve the stomach unless the primary foci in teeth and tonsils have been eradicated.

In a considerable number of patients in whom, after the removal of all infection in teeth and tonsils, the symptoms still persist, improvement and recovery have followed only after administration of the autogenous vaccines obtained from cultures from the stomach. The question as to the relative sterility of normal stomachs is an academic one, but the presence of pathogenic colon bacilli and streptococci associated with absence of hydrochloric acid certainly cannot be considered normal. The fact that the acid returns to normal and the bacteria disappear after vaccine treatment is convincing evidence of the relation of the infection to the decrease of the acid.

It should not be implied that merely by clearing up the stomach conditions such good results are obtained in the patients. In all probability the vaccine has a very potent effect on the whole system as well as upon the stomach and probably eliminates the infection wherever it may be. This is especially true in the cases where colon bacilli exist in combination with various types of streptococcus.

INFECTIONS OF THE LOWER INTESTINAL TRACT

While a large percentage of our cases presented evidence of gastric infection, fortunately only a small proportion showed infection of the lower intestinal tract. In the latter condition, treatment is more difficult and complicated, and often surgical means are necessary to produce results. This is especially true of lesions in the colon. The diagnosis of this condition is made, first upon the history of habitual constipation, sometimes alternating with diarrhoea and the passage of large quantities of mucous, usually extending over a long period of time and existing long before the development of mental symptoms. Accompanying this constipation there are frequent

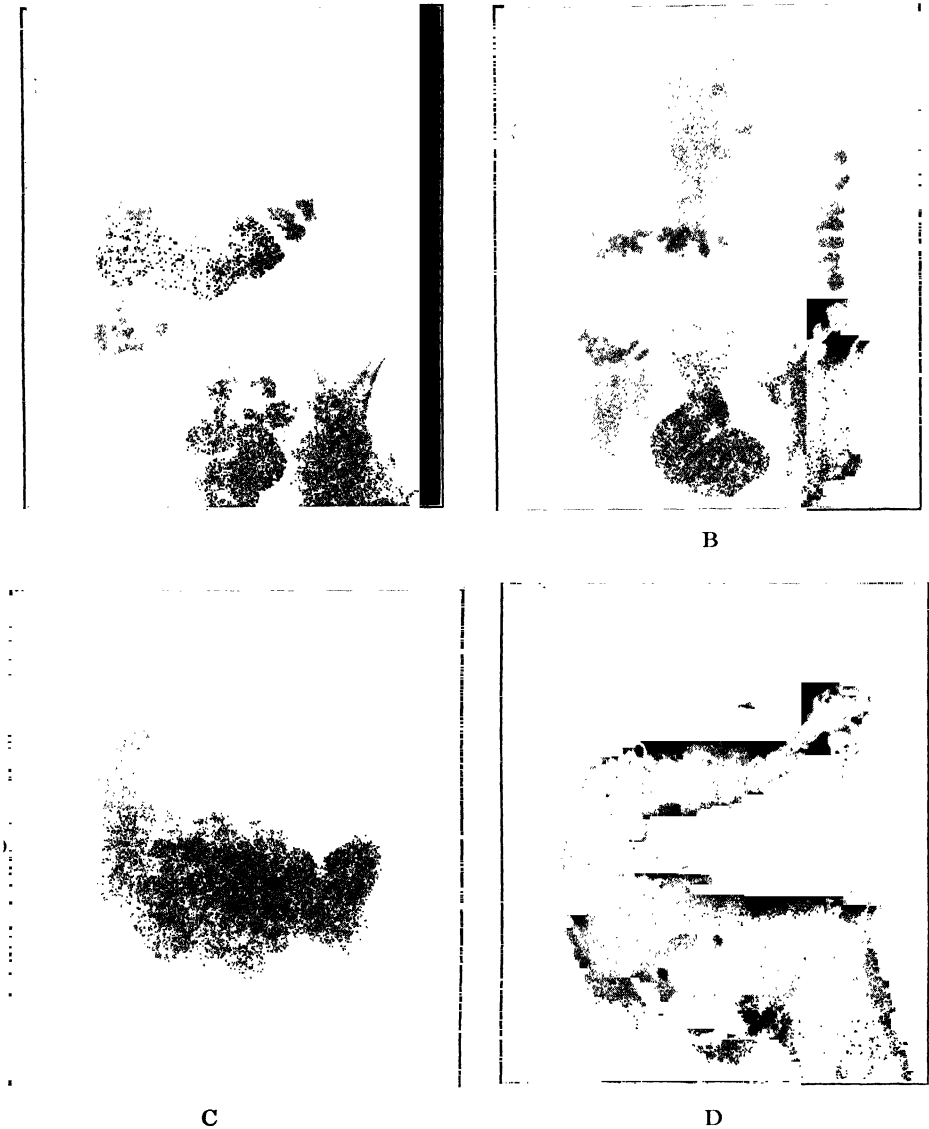


FIG. 20. Radiographic studies of the gastro-intestinal tract in a case of dementia praecox of three years' duration.

A. Plate made 48 hours after barium meal. Retention of the bulk of meal in the ascending, and transverse colon. Appendix visualized.

B. Plate made 4 days after meal. Retention of meal in cecum, ascending and transverse and descending colon. Some of the meal is in the rectum.

C. Plate made immediately after barium enema, showing outline of colon, with pronounced ileo-cecal leakage. The enema has passed from the colon through the ileo-cecal valve into the small intestine; indicative of a pathological condition of the cecum.

D. Plate made 24 hours after barium enema, showing marked retention in cecum, ascending and transverse colon.

“bilious attacks,” with more or less abdominal pain often misconstrued as “indigestion.” Any patient, with such a history, probably has had chronic appendicitis. Physical examination will, in most cases, reveal a tenderness on the right side and a certain amount of rigidity of the right abdominal muscles. Often the colon is filled and dilated, especially on the right side.

The third means of diagnosing this condition is by complete radiographic studies of the tract after a test meal of barium sulphate. Plates taken at twenty-four hour intervals will show pronounced delay in the movement of the test meal through the intestine and will usually indicate localized areas of delay. In most cases where there is marked localized delay, after 48 hours, evidence of intestinal lesion is shown at operation. In some cases, such delay may persist for six and even nine days. Plates made after administration of barium enema also give valuable information. (See Fig. 20.)

From the diagnostic methods referred to above, it can be determined that there is abdominal disease, and that an exploratory abdominal operation is justified. The detailed extent and nature of the lesion cannot be determined except at operation. In some cases a chronic infection of the appendix is found to be the cause of the trouble, but in others the condition is more extensive and the right side of the colon may be seriously involved. In these cases a partial resection of the colon is necessary,—a successful procedure, only, in the hands of a highly trained abdominal surgeon. (Figs. 21; 22.)

If the infection is limited to certain areas, segmental in character, it may be possible to remove such infection by resection. Marked improvement in the mental symptoms has repeatedly been observed following such a procedure. If, however, the infection is very extensive, involving more of the bowel than is considered wise to remove, the disease must be attacked either by vaccine or serum. This is especially true when evidence of infection is found to extend throughout the whole length of the small intestine. In these cases the administration of specific anti-streptococcic and anti-colon bacillus serum, made from strains isolated in the laboratory of the State Hospital, has proven very successful.



FIG. 21. Megasigmoid measuring 28 inches in length. Note large stellate scar and numerous enlarged mesenteric glands.



FIG. 22. Dilated cecum, with constriction at hepatic flexure, indicated by finger. Dilated transverse colon, all in course of excision. Note great many enlarged glands in mesentery opposite to the constriction. Mesentery ready for ligation.

While the mortality rate of operation for removal of a part of the colon is not high,—being slightly under 8 per cent—psychotic patients in whom the infection has been of long standing and of great and specific virulence, are not good surgical risks and yield a higher mortality rate. This is, in part at least, due to the fact that the heart muscle has undergone serious damage from the infection and that organ is unable to meet the slightly increased strain of post-operative conditions. Carefully administered gas-oxygen anaesthesia with a minimum of ether is a *sine qua non* in the successful conduct of these cases.¹

A very common sequel of this work is the surgical relief of constipation. Many psychopathic patients in the State Hospital are thus proven, in reality, to have been chronic intestinal invalids in whom the psychic phenomena were purely secondary to an unrecognized, but nevertheless extensive, disease in a congenitally misshapen and deformed bowel. Indeed, it is not uncommon to observe restoration, by means of this new and daring surgical departure, of the daily bowel function, in patients, who, from earliest childhood, had been obliged to resort to the use of strong purges every night of their lives.

It must be clearly understood, however, that the improvement in this type of chronic intestinal invalid comes not principally from the relief of the constipation, valuable as this is, but primarily from the removal of the immense focus of infection in the bowel structure itself. This explains the futility of treating these patients by cathartics or by rectal irrigations, as the trouble is not principally in the lumen or cavity of the bowel, but in the wall. We are indebted to Dr. John W. Draper for his interest and valuable investigations of infections of the intestinal tract in the patients at the New Jersey

¹ Since the above was written, the mortality rate of resection of the colon has been materially lowered. This can be attributed to the routine pre-operative administration of a combined, polyvalent anti-streptococcus and anti-colon bacillus serum. In the last 42 consecutive resections only three deaths have occurred. One was due to post operative pneumonia (twenty-four hours) and another to bronchopneumonia four weeks after operation, and a third to a sudden mechanical obstruction ten days post-operative. Ruling out the two fatalities due to pneumonia, the mortality rate is only 2.3 per cent.

State Hospital. For the last three years he has given freely of his time, and his colon resections now number over one hundred and fifty. As a result of this work at least twenty-five patients owe their recovery to his skill. He has operated upon all the patients reported in these pages, and grateful recognition is hereby extended to him by the writer.

GENITAL ORGANS

Very serious infection may exist in the cervix or neck of the uterus and in the tubes and ovaries. This discharge-producing infection may be an extension through the lymphatics from other foci of infection and may frequently be caused by bacteria of the streptococcus and colon groups. It should be understood, once and for all, that this chronic infection is not gonorrheal in origin. The presence of a discharge does not imply venereal disease, as the derivation of the word gonorrhea erroneously suggests. We have found that vaccine and serum produce little or no effect in healing the diseased tissues in this region, probably because of the glandular, tonsillar-like tissue in the cervix.

When the infection is found, surgical means should be employed to eradicate it, and the technique most satisfactory in our hands has been that originally elaborated and described by Sturmdorff. As already noted, this work is an excellent example of conservation by surgery, for by it many ovaries have been saved.

The seminal vesicles in the male may be the seat of infection, and here again surgery affords the only relief. We have on record many cases which have recovered following the removal of the above described local areas of infection.

INFECTION OF THE SINUSES

Infection of the various sinuses frequently exists but as a rule, except in the case of the antrum and the mastoid, it has been found not to persist after the infection of the teeth and tonsils has been eliminated. Sinuses should always be thoroughly examined either by illumination or X-ray, and when in-

ected should be properly treated. In a few cases chronic mastoiditis has been reported and recovery of the patient has occurred following an operation. Patients who have a chronic discharge from the ear should be examined for masoiditis which, if found, should be removed by operation. In the cheek bone there is a large cavity known as the antrum of Highmore. It communicates with the nose through a small opening which is too high to give good drainage. It would hold about a teaspoonful, is irregular in outline, and the floor of the orbit forms its upper wall. Its thin and delicate base rests upon the upper molar teeth. The roots of the second bicuspid and the first molars often penetrate it. So close is the relation to these teeth, that it is very easy for the infection to involve the antrum. Extraction of these teeth does not always relieve the antrum infection, which may persist and be entirely overlooked. Many vague symptoms of heretofore unknown origin have disappeared after proper surgical treatment of this region. Because of its growing importance from the standpoint of diseases of the eye and ear, as well as systemic toxemias, this cavity is certain to receive in the future more attention than it has in the past.

The other sinuses, i.e., the frontal, sphenoidal, and ethmoidal are also apt to be involved as is also the mastoid, but usually from the tonsils rather than from the teeth. In every case they should all be thoroughly investigated, especially if the removal of all other foci does not produce the desired results.

DISCUSSION OF TREATMENT

VACCINE THERAPY

All these sources of infection should be thoroughly investigated and eliminated so far as possible, and further treatment should be instituted early, and before permanent damage is done to the brain, after which all methods of treatment will be ineffective.

Vaccine therapy is of very recent origin and is the result of very important discoveries of Sir Almuth Wright, who in 1904 published the first important contribution to this now very

necessary branch of medicine. As a result of his work it was possible to immunize the individual against typhoid fever by inoculating or vaccinating the individual with the cultures of the typhoid bacillus, which had been grown upon artificial media and then killed by heating.

The efficacy of this immunization was shown in the world war, where the deaths from typhoid fever were negligible as compared with the deaths in the epidemic of typhoid so familiar during the Spanish-American war. No one would deny that this great contrast was due to the fact that the soldiers in the world war were successfully immunized against typhoid fever. As a result of Wright's work attempts have been made both to immunize the individual against certain other types of infection and to eradicate the infection after it had obtained entrance into the system. Many of these attempts have been unsuccessful for reasons which will be explained later, and the efficacy of vaccine therapy has been vehemently disputed by some distinguished men and upheld by others.

Unfortunately, the bacteria of the streptococcus group vary greatly both biologically and culturally, and therefore differ from the typhoid bacillus, which is a uniform strain. Because of the biological variation in the different strains of streptococci (ten strains have been isolated in the laboratory of the State Hospital at Trenton), it has been found by Dochez, of the Rockefeller Institute, that one strain will not immunize against another strain. Therefore, vaccines in order to be efficient must be made from the specific strain found in the individual. One of the errors of the earlier work in vaccine therapy was due to the belief that vaccine made from any strain of the streptococcic group would be effective against any other strains.

A careful differentiation of the various strains is necessary in order to find all the varieties existing in a given individual. Merely making vaccines, for instance, from cultures from the teeth, will not answer the purpose. If that strain is the only one found in the individual, then the vaccine will be effective, but when several strains are found, for instance, in the stomach, it is necessary for all of them to be used in the vaccine.

One of the methods by which vaccines act upon the infecting bacteria is by stimulating the white corpuscles to greater activity. Hence, the infected area must have a sufficient blood supply to allow the corpuscles to act. We have found that the tooth sockets by reason of a very limited blood supply offer no chance for vaccines to influence the infection at the roots. For infected tonsils, also vaccines have only a limited value. The infection may be considerably reduced, but not entirely eradicated because the blood supply does not reach the center of the crypts, but only the walls. Hence, it is necessary to remove infected teeth and tonsils in order to eradicate the infection.

The stomach and intestinal tract, probably because of the elaborate blood supply offers the best medium for the action of the vaccines. As a result, successful immunization against typhoid was made possible, but while it was possible to immunize the individual against typhoid by vaccines, when typhoid fever developed it was found that the vaccines had no appreciable effect upon its course. This has been explained by the fact that the infection was so overwhelming that the white corpuscles could not overcome it. Hence, in the cases with limited areas of infection in the gastro-intestinal tract, the autogenous vaccines have proven very helpful in eliminating the infection. But, when the infection is extensive, the vaccines are only partially effective.

All the patients admitted to the State Hospital at Trenton have a course of treatment by vaccines, which are made from the bacteria found usually in the stomach, not only from the various forms of streptococci but from the colon bacilli as well. The post-operative cases also receive treatment by vaccines made from the cultures isolated from the mesenteric lymph glands removed at operation. In many cases the streptococci or colon bacilli, or both are found in these glands.

We would unhesitatingly condemn the use of stock, or commercial vaccines in these cases—we have always used autogenous vaccines made in our own laboratory.

As the efficacy of autogenous vaccines is limited in effectiveness to rather small areas of infection, we found it necessary

to prepare an anti-streptococcus and anti-colon bacillus serum to overcome this difficulty.

SERUM THERAPY

An anti-serum is made by inoculating an animal, usually the horse, with specific bacteria until the blood serum of the animal becomes highly potent and capable of destroying these bacteria. Thus, we have an anti-toxin for diphtheria and recently an anti-pneumococcus serum for pneumonia, both of which have proven effective in combating these two diseases. Through the courtesy and assistance of Dr. John F. Anderson we were able to obtain an anti-serum for streptococci and colon bacilli which was made by inoculating horses with the various strains of the bacteria isolated in the Laboratory of the State Hospital at Trenton. Thereby, we have obtained a highly potent and specific anti-serum for the bacteria which we find predominating in the patients at that hospital. And we attribute the success, following its administration, to the fact that it is specific, i.e., made from the strains it is intended to combat.

The anti-serum probably acts directly upon the bacteria, killing them in much the same way as a germicide, or antiseptic does, but it has the advantage of being specific and, therefore, more effective. There is nothing secret about either the vaccine or serum used at the State Hospital at Trenton. The former can be made by any well equipped laboratory and the latter by any laboratory devoted to the manufacture of biological products.

It is interesting to note the effect of anti-streptococci serum upon the post-operative cases, where no improvement follows the removal by operation of the infected areas in the colon. It was sometimes noted that the enlarged and infected lymph glands of the mesentery extended throughout the whole length of the small intestines. Therefore, the removal of the infected colon could have no appreciable influence on the other areas of infection. But the administration of serum did, apparently, eradicate the infection and following this the mental symptoms were arrested. This has occurred in several cases but the ad-

ministration of serum alone has not proved successful in eliminating the infection in the colon without operation. In several patients of the manic type the serum had no effect upon the mental symptoms, which were arrested only after the removal of the infected colon. In two of these cases the improvement was immediate—within twenty-four hours after the operation—and they have not relapsed.

ROUTINE TREATMENT

Every patient should receive a course of treatment by auto-genous vaccines after the infected teeth and tonsils are removed but not before because of the probability of a severe reaction. Within a week or two after the vaccine treatment has been completed, a course of treatment by anti-streptococcus and colon bacillus sera should be given. By these two methods the systemic infection should be eradicated. If the patient fails to recover and further examination reveals severe intestinal infection, then operation for removal of the infected area of the colon should be the next step. If the cervix, or the seminal vesicles are found to be infected they should also be removed by surgical means. No ill-effects have been noted from the administration of either vaccines or serums.

In the vaccine administration there is frequently some local reaction and mild systemic reaction. There may be also some reaction following the administration of serum. Frequently a serum rash will develop and while it will cause considerable discomfort to the patient no serious results have been noted. As a rule the patients do not show any effects serious enough to justify the discontinuance of the treatment.

NECESSITY FOR DETOXICATION

While many have disagreed with our views, and would not believe that a direct relation existed between chronic infections and mental disorders, at the same time, no one versed in the theory of modern medicine will disagree with our practice of eliminating, as far as possible, by the usual and standard methods, all pathological conditions found in the psychotic patient.

Let the academic question of cause and effect rest for a while. Because the patient has a mental disorder should that prevent him from receiving the very best physical treatment directed by modern methods? Whether or not one believes there is a direct relationship between the infection and the psychosis, it is certain that the patients, on recovery after detoxication, are much relieved to find that their unexplainable mental condition was due to poisoning from the infection, rather than to lack of control or will power on their part or, as has been suggested to most of them, to errors in thinking and lack of adjustment to their environment.

One of the most gratifying features of our work, aside from the improvement of patients who formerly became chronic, has been this evident mental relief when the nature of their troubles became clear to them. One can see, in the development of these methods, not only the means of enlightening the public as to prevention and treatment, but also a removal of the stigma which is, even to this day, wrongfully associated with insanity.

OTHER METHODS OF TREATMENT

Treatment should not be limited, exclusively, to the removal of foci of infection, all-important and necessary as this has proven to be. As has been stated, change in environment is, in most cases, essential. The usual rest treatment is to be carried out and every means employed to increase the weight of the patient by careful feeding, etc. Hospital surroundings should be as cheerful as possible and all relics of asylum methods should be abolished, or, as we are wont to say, there should be "sane surroundings for the insane." The substitution of psychopathic hospitals or psychopathic wards in general hospitals in place of the congested, ill-ventilated asylum wards, will, it is much to be hoped, in the near future, be general throughout the country. Mention need hardly be made of the fact that no form of mechanical restraint should be used, although it is employed in far too large a number of hospitals for the insane today.

When the patients begin to improve they should be removed

to convalescent wards, so they may be spared the unpleasant sights of the acute cases. Plenty of fresh air and sunshine is necessary even when the patients are confined in bed and as soon as their condition permits they should be kept out of doors a greater part of the day.

HYDROTHERAPY

Certain forms of hydrotherapy have been very useful in the treatment of mental disorders, notably the continuous warm bath in cases of extreme maniacal excitement. Patients have been kept for hours daily in such a bath and often they will sleep at night without sedatives as a result. This form of treatment formerly was empirical and used for the quieting effect upon the patient. Its efficacy can now be explained on the grounds that the continuous bath is the best method we have of eliminating systemic toxemia. It still has its place but the elimination of the infection has diminished the necessity for its prolonged use. In all operative cases, both preceding and following the operation, the various forms of hydrotherapy are extremely valuable. The pre-operative treatment has a good effect especially in improving the eliminative function of the skin, and post-operative treatment hastens surgical convalescence. In both instances the main benefit is produced through the elimination of harmful toxins.

PSYCHOTHERAPY

As we do not at present practice psycho-therapy upon our patients we will not here discuss the value of this form of treatment. In fact it is becoming more and more evident that it is unwise to emphasize the mental symptoms to the patient. The majority of them have, at the time of the onset, a keen realization of their mental state. At this period, if it is explained to them that their trouble is due to infection which can be removed, they will always voluntarily consent to go under treatment, either at home or in a proper hospital. If the mental symptoms are accentuated very often the patient will become suspicious and lose confidence in the physician, at

least that has been our experience, whereas, if the physical causes are explained to the patient, and he is told why he has such peculiar symptoms, he will welcome advice and treatment.

This stage, so favorable to proper treatment, is superseded after months of neglect by an entirely different attitude and instead of coöperation one meets antagonism to all forms of treatment. Those practising psychoanalysis are unable to treat such patients because of a lack of coöperation on the part of the patient. But such lack of coöperation need not prevent the removal of foci of infection for anesthestia can always be used to obtain the required result. We are not in a position to criticise psychotherapy as applied to the mild psychoneuroses and extra-institutional cases with mild psychoses. It is possible that removal of causes for worry and clearing up difficulties in their environment may be extremely valuable, and, that therefore, its use is justifiable.

It is possibly a good and powerful anodyne but its use carries with it the same danger associated with all anodynes, viz., the masking of the symptoms and consequent inability on the part of the physician to recognize the underlying causes.

The extreme to which psycho-therapy is carried in some institutions is not justified by the results produced as we have said before. After several years devoted to psychoanalysis and psycho-therapy, the writer, failing to observe any benefit to the patients, was compelled to discard this form of treatment and to seek other methods which would reveal the cause of the mental disorders. The result of such work now speaks for itself and will be discussed below.

RECREATION AND OCCUPATION

Recreation and occupation are very essential in the treatment of mental conditions and are especially valuable after the elimination of all infection. All cases should be given diversional occupation as soon as it is safe for them to be out of bed. Classes in physical exercises, wherever possible, should be organized as part of the daily routine.

RESULTS OF THE WORK AT THE STATE HOSPITAL AT TRENTON

It should perhaps be stated at the outset that we have never, either in contributions to medical literature, or in annual reports, made any claims as to "curing patients" by the extraction of teeth. The investigations have been concerned with the detection of abnormal physical conditions existing in the psychotic individual and with methods for the elimination of the same. The State Hospital has been unjustly dubbed "that mecca of exodontia" by those wilfully ignorant of the scope and scientific accuracy of the work.

There should not be destructive criticism of efforts to study the psychotic individual as a whole. Limiting investigation to the mental symptoms is a method which has been significantly barren of results. The attempt which has been made at Trenton to adopt the best methods developed in the work of progressive medical centers and to utilize these methods in making a diagnostic survey of the patient is above reproach.

We would be culpable not to recognize the benefits derived by the patients from the work of the last three years. During an experience of eighteen years in treating and caring for the insane, the writer has had the experience, in common with others engaged in this work, of utter helplessness in doing anything for the patients who did not recover spontaneously. All efforts were useless for the patients who became chronic and nothing could then be done which had any apparent influence in reducing the ever increasing net annual increment in the hospitals for the insane.

All those engaged in this work had the discouraging experience of observing patients, year after year, gradually becoming more and more demented, in many cases irrespective of the original diagnosis. Occasionally and only very seldom, cases, which had been diagnosed as dementia praecox, unexpectedly recovered and the diagnosis was cheerfully changed to manic depressive insanity, but the physician had no delusions that anything he had done contributed to the patient's recovery.

In Fig. 23 is shown the average proportion of monthly discharges to admissions, extending over a period of ten years,

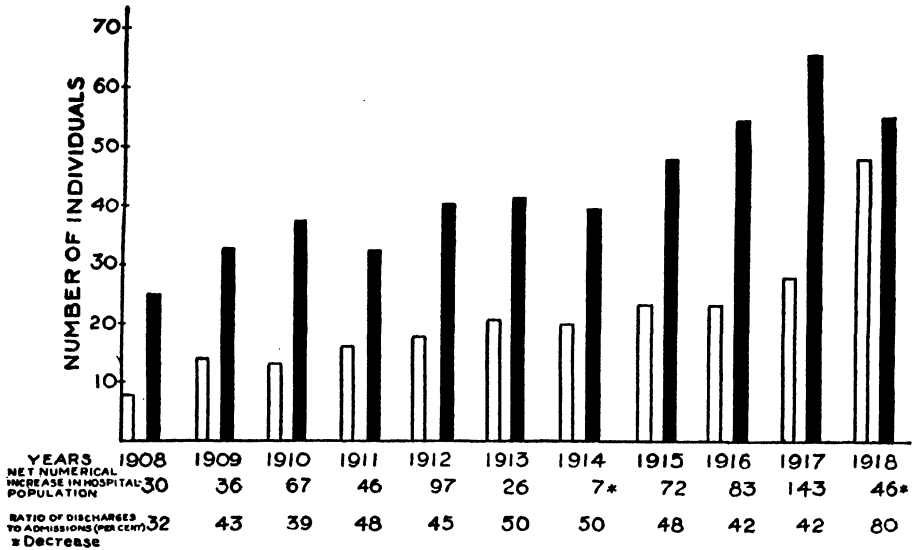


FIG. 23

The white columns stand for discharges; the black columns, for admissions.

COMPARISON OF AVERAGE MONTHLY ADMISSIONS AND DISCHARGES,

NEW JERSEY STATE HOSPITAL, TRENTON, 1908-1918

- I. Ratio of average monthly discharges to admissions, 1908-1917.....43 per cent
Ratio of average monthly discharges to admission, 1918.....80 per cent
Increase in the ratio of average monthly discharges to admissions, 1918.37 per cent
- II. Average yearly numerical increase in the hospital population, 1908-1917.... 50
Decrease, in the hospital population, 1918..... 46
Net gain in discharges, 1918 96
- III. Net annual increase in the hospital population, 1908-1917..... 50
Decrease, not including transfers from Morris Plains, 1918..... 91
Net decrease, 1918 141

prior to 1918, the year in which this work was intensively applied, which proportion was 43 per cent. This number is rather large and really represents all the patients who were considered recovered and improved, in order to make the comparison with the year 1918 as fair as possible. In 1918 the monthly discharge rate jumped to 80 per cent, and the cases included in these figures were those who were considered recovered after a residence at home of four months.

Similar results were obtained in the years 1919 and 1920, except that with the advent of prohibition the alcoholic cases decreased from 21 per cent in the males to only 7 per cent, and, as the alcoholic cases furnished 25 per cent of the discharges it

can be seen that it could not be expected that the recovery rate would be so high; and that was what happened, although the rate remained the same when applied to the so-called functional group.

It should be emphasized that we have not failed to recognize the fact that, at present, as in the past, a certain proportion of the so-called functional group recover spontaneously and we would not take any credit to ourselves because patients in this class recovered, a fact often lost sight of by the psychoanalysts. But, when the recovery rate increases from 40 to 80 per cent, as a result of detoxicating these patients, it is justifiable to assume that something has occurred in the mechanism of the psychoses and that this influence, whatever its nature, has been beneficial.

It could hardly be said that a "readjustment of their conflicts" had occurred, as they had had no psycho-therapeutic treatment. The main function of the physician is to relieve the patient, and if the statistics of the hospital cannot be used to prove the results of the medical treatment, then we are at a loss for a criterion upon which an acceptable estimate can be made.

As a further evidence that this work has been effective in arresting the mental symptoms of these patients, a comparison of the annual increase for the ten year period with that of the last three years is significant. This increase averaged about 50 for the ten year period and for the last three years, prior to 1918, the average was 80 (Fig. 24).

Since 1918, instead of a net annual increase, there has been a net annual decrease, averaging 67 for each of the three years, due entirely to the new methods adopted. There has been no attempt to discharge patients for the purpose of creating erroneous impressions of the work, the speedy return of these cases, unfit for discharge, would rightly discredit anyone who would be foolish enough to practice such a palpable fraud. Such a practice could not be too severely condemned.

Aside from the humanitarian aspect of the restoration of the patients to their families and as normal members of the community, it is a very decided economic advantage to the State,



NET INCREASES ARE SHOWN ABOVE, NET DECREASES BELOW, THE BASE LINE

FIG. 24. Comparison of yearly net increases or decreases (exclusive of transfers) in the population of the New Jersey State Hospital, Trenton, 1908-1918.

in point of dollars and cents, in that the State does not have to support them. It is a conservative estimate that there will be a saving of at least \$90,000 in the maintenance of these cases this year no matter whether they may be considered recovered or not, for, instead of being a financial burden to the State, they are, in many instances, supporting families as well as themselves.

In studying the statistics of the toxic group for the last 13 years we find a very remarkable increase in the discharge rate. Since 1918 we include in this group the manic depressive cases, dementia praecox, toxic delirium, paranoid condition and the psychoneuroses. With the exception of the toxic delirium these cases have been usually classified in the functional group.

By consulting Fig. 25 it can be seen that the average proportion of discharges to admissions in this group was 37 per cent. In 1914, the year in which there was a de-

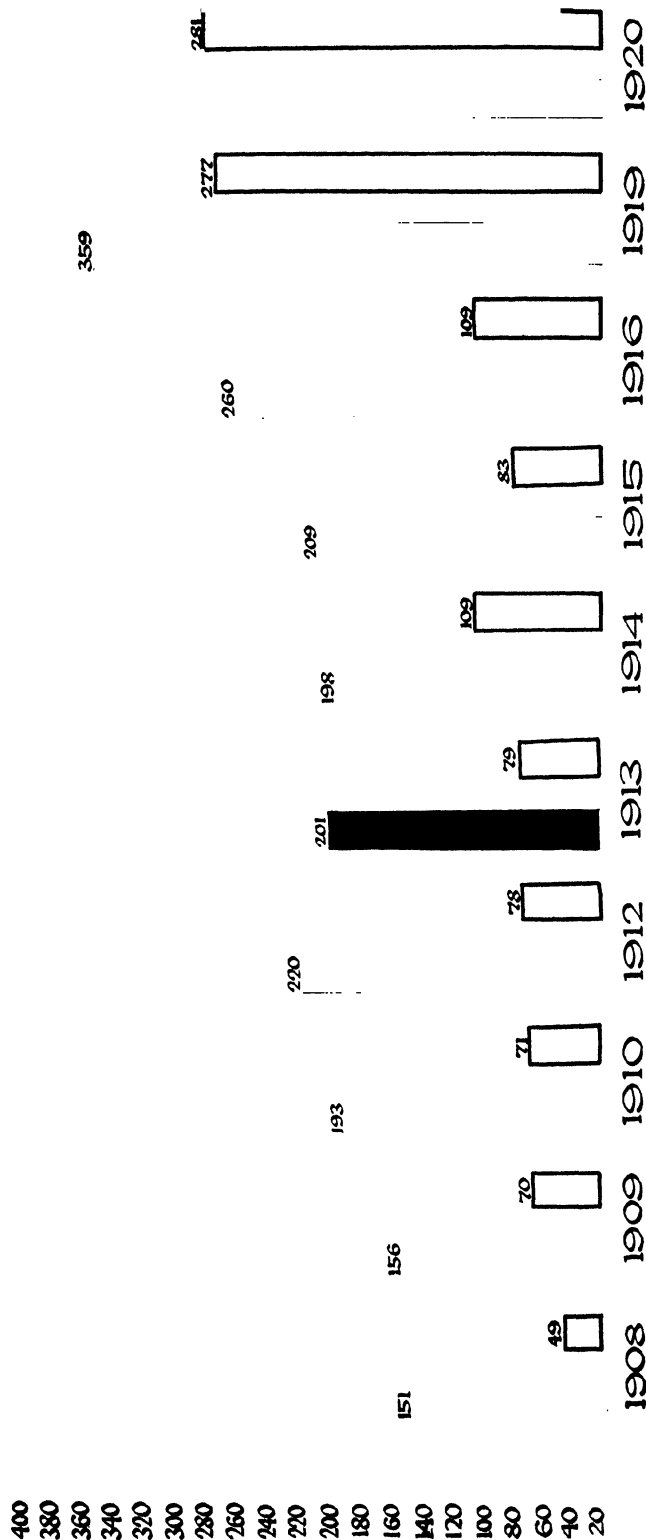


FIG. 25. Percentages of discharges to admissions in the "functional" group from 1908 to 1920. (1917 and 1918 are not given because detailed statistics were not compiled during these two years, on account of the conditions existing due to the war.)

Yearly average per cent of discharges to admissions.....	37%
In 1914 per cent of discharges to admissions.....	55%
In 1919 per cent of discharges to admissions.....	77%
In 1920 per cent of discharges to admissions.....	65%
In 1921 per cent of discharges to admissions.....	70%

■ Admissions

□ Discharges

crease in the hospital population, we find that the discharges reached 55 per cent, and we have eliminated this year in computing the average of 37 per cent. This decided difference in the discharge rate in relation to the whole number of admissions for the year 1914, as well as the difference in the functional group, as compared with the years prior and subsequent to 1914, can only be explained by the fact that the resident dentist, upon his own initiative extracted over five hundred teeth during his term of service. As we were not especially interested in infections at that time this fact made no impression upon the writer and was only discovered when these tables were prepared later.

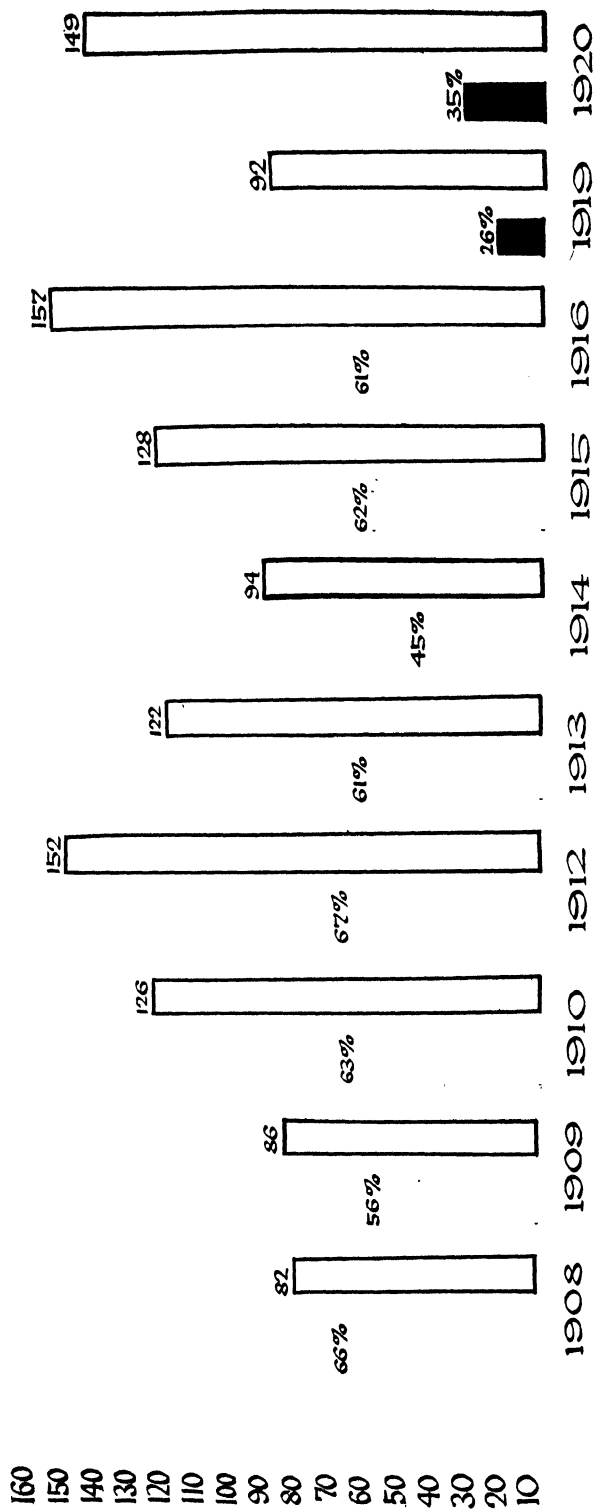
In the year 1919 this discharge rate reached 77 per cent, and in 1920, 65 per cent.

The residual cases of this group, as shown in Fig. 26, also tell the story. The average proportion for the ten year period exclusive of 1914 is 56 per cent, and in 1919 and 1920, 26 and 35 per cent, respectively.

So it can be stated that the reason for this change for the better in the last three years certainly is attributable to the application of modern medical methods in removing foci of chronic infection.

PERMANENCE OF RECOVERIES

The question is frequently and fairly raised, "How permanent are the recoveries in these patients?" The answer lies in the consideration of the returned cases after treatment. In the year 1918 there were admitted to the State Hospital at Trenton 380 patients, who were classified in the so-called functional group. At the end of the year there remained only 160 in the hospital. At the end of two years there were only 60 of this group in the hospital. This means that 320 had been discharged, or 80 per cent of the patients admitted. Out of these discharged patients only 20 had to return to the hospital during this period and 12 of these were found to have minor infections, which had been overlooked. When the remaining infected teeth were extracted or infected tonsils, which were overlooked were removed, they were able to leave the hospital.



Graphic chart showing Residual Cases of the Functional Group remaining in the Hospital.

- Percentage of cases remaining-average 63% (with 1914, 56%)
- Actual cases (1919-20 Av. 30%)

FIG. 26. Graphic Chart showing actual number of residual cases of the "functional" group in the hospital at the end of the years from 1908 to 1920 (1917 and 1918 being left out as explained in Fig. 25). The average for this period excluding 1914 was 63 per cent, and with 1914 56 per cent. For 1919 and 1920 the average was 30 per cent.

The remaining eight were found to have serious intestinal involvement and were later operated upon. Of this number only 4 are now in the hospital. At present, nearly two and one-half years later, only 51 of the original 380 are in the hospital, and 9 of these are convicts. It is interesting to note that *the re-admissions to the hospital are not larger than the average for a ten-year period before 1918.*

Of further interest is the shortening of the period of residence in the hospital of the patients with acute psychoses. Those who previously recovered spontaneously averaged *ten months* in residence. The average residence of these patients in the hospital in the last three years has been only *three months*. The state hereby saves seven months' maintenance. In addition many of the patients were able to work and thus to enjoy economic independence soon after returning home.

It is necessary to emphasize the grave dangers of incomplete measures both as to examination and treatment. A sense of false security will often be engendered by the apparent recovery of the patient, as for instance, when a patient whose fundamental trouble consists in a grave gastro-intestinal lesion unexpectedly recovers after the extraction of a single infected tooth. Sooner or later, as we have found to our chagrin, but no longer to our surprise, under these conditions, the mental symptoms return. It is very difficult to explain the recovery of the patient following the elimination of one focus when a more severe infection remains. One should be especially watchful for this condition in cases of long duration or cases which have had repeated attacks of mental trouble, with fairly lucid intervals.

The following case is cited to illustrate this condition:

Single girl, age 36. Admitted May 9, 1911, from Bloomingdale Hospital, White Plains, New York, where she had been since 1910. She had had four previous attacks, the first occurring at the age of 19. She finished school, however, and graduated as a trained nurse. The attacks increased in severity, and when she was admitted in 1911, the attack had already been of seven months' duration. On admission she was very much confused, apprehensive, agitated and violent, and re-

sistive at times. She did not improve after a residence of five years in the hospital and was considered a chronic demented patient. In June, 1916, the resident dentist, after much difficulty, extracted an infected crowned molar. Soon afterward she began to improve, in October, 1916, she had apparently recovered and was allowed to go home where she remained for three years. She was visited frequently by the fieldworker and found to be in an apparently normal condition. She was interested in outside work such as that of the Red Cross.

It is interesting to note that for many years she was subject to severe headaches and gastro-intestinal upsets, biliousness and vomiting, these attacks occurred at frequent intervals and continued after she left the hospital. And like many such patients, she had had an operation for appendicitis some years previously. In January, 1919, she began to show vague mental symptoms. She became nervous and irritable and had several confused spells. She was advised to return to the hospital which she did voluntarily and radiographic studies of the intestinal tract in her case revealed a severe lesion of the colon. She was operated upon November 20, 1919, and a large segment of the bowel removed. (See Fig. 27.) She made an uneventful convalescence and later had normal evacuation without cathartics, and her obstinate hemicranial headaches disappeared. Following the operation her mental symptoms disappeared and she was apparently normal. For some months she took charge of the surgical ward of the State Hospital as she was by profession a trained nurse. After much hard work she became mildly depressed and attention was directed to her teeth which, because of her request, had not been thoroughly treated for infection. Six teeth were found to be infected. After these were extracted she made a rapid recovery. This case also illustrates the necessity for persistence in searching for the infection and eliminating it. If mental symptoms recur after the removal of one focus or set of foci of infection, then further search should be made and other foci will usually be found and the return of the mental symptoms thus explained. This constitutes very important evidence in favor of the hypothesis that focal infections are responsible for the so-called functional psychoses.

DELAY IN TREATMENT

Unfortunately for the many chronic patients confined in hospitals for the insane today, their disease has progressed to the stage, where remedial therapy is entirely unsuccessful. There are at the State Hospital at Trenton 900 cases of dementia praecox, none of whom will ever recover. It has been difficult to impress this fact upon the friends and relatives of the chronic patients who apply for admission to the State Hospital. To this class of patients, and especially their friends, undoubtedly the publicity given to this work has been most unfortunate. It aroused hope for treatment in these cases when as we have explained none can be expected.

We have stated repeatedly that nothing can be done for the chronic patients, especially dementia praecox in the terminal stage. But, in spite of this, the idea persists that these methods are applicable to all stages of the disease. Elimination of infection to be effective in arresting the mental symptoms must be instituted *early*, otherwise no favorable outcome can be expected. The reason for this is that the brain tissue has probably become permanently affected as a result of the long standing toxemia and no repair is possible, even with the elimination of the original infection. But, the situation, in the early stages of the chronic mental disorders, is quite different. When treatment is instituted early it has proven successful in arresting the mental symptoms whether diagnosed as dementia praecox,—the deteriorating type of psychosis,—or manic depressive insanity which tends towards spontaneous recovery. This statement is supported by the fact that the chronic cases in the State Hospital have not increased in the last three years, in fact there has been actually a decrease and not an accumulation of these patients as was formerly the invariable rule. Over 50 per cent of the permanent residents in the state hospitals belong to the dementia praecox group. Practically all of these cases could not only have been prevented but their symptoms arrested after the onset, if the methods of eliminating chronic infection had been applied. There can be no excuse for failure to treat such cases in early stages now that the cause is known. No stronger plea could be offered for the prosecution of the

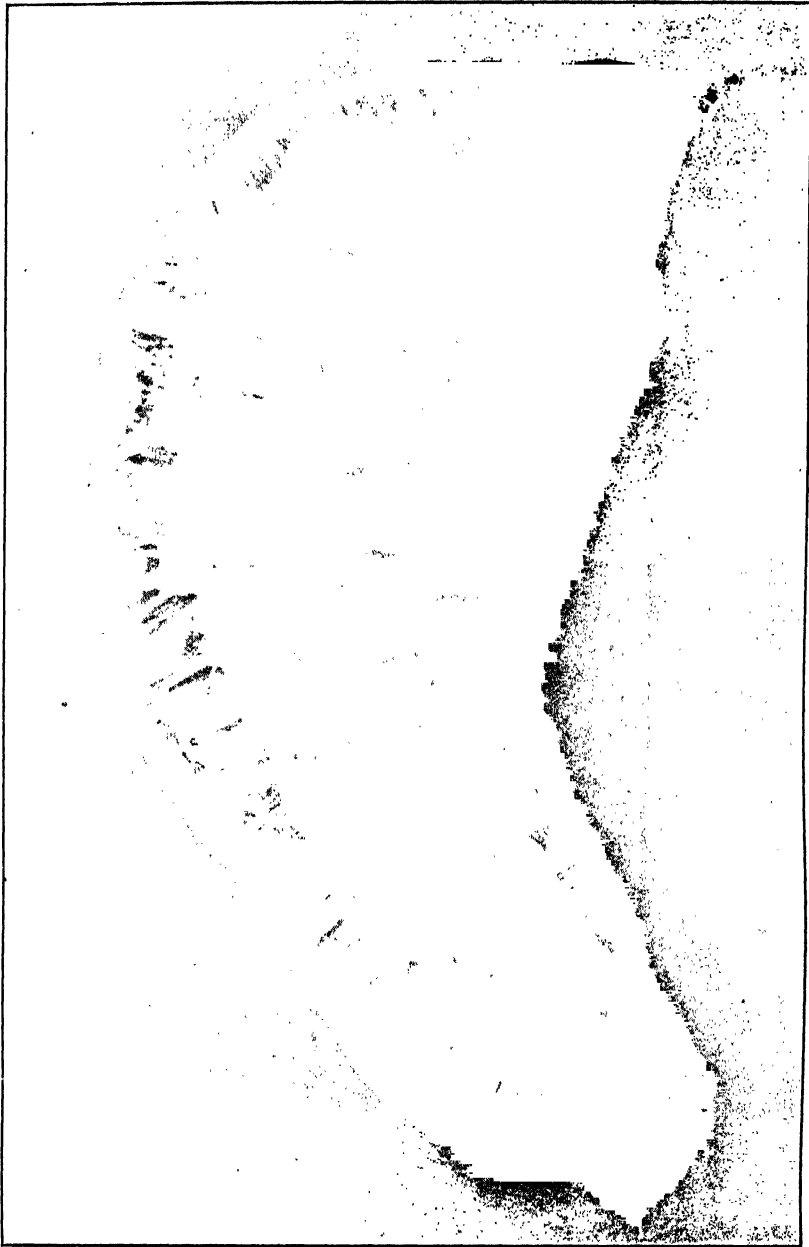


FIG. 27. Drawing of a resection of transverse (left side) and descending colon removed from case reported on page 117. Note extreme thinness of walls and extreme dilation, and absence of rugae. Only a thin permeable membrane remains.

work outlined in these pages than the effect it has had in arresting the ever-increasing number of human derelicts, now consigned, for the rest of their years, to mental obscurity and darkness.

The "do-nothing" policy of those who continue to oppose any form of treatment, because they are convinced that insanity is the result of hereditary causes and constitutional defects and, therefore, inevitable and incurable, is beyond comprehension. However, for these afflicted individuals there is the prospect of the dawning of a better day. These relics of medical superstition and barbarism will be supplanted by modern biological conceptions based upon the proper recognition of the true relation of structure to function.

CHAPTER V

REPORT OF CASES

During the last three years over 1000 patients classified in the "functional" group (which includes the acute types, the manias, melancholias, depressions, and the more chronic types, known as dementia praecox, and the psycho-neuroses) have been successfully treated by the methods outlined in these pages. These successful cases represent over 70 per cent of the admissions to the hospital of this group, and it is of importance to note that the great majority have remained well for over three years.

This large group of cases, we believe, should offer sufficient evidence of the truth of the conception that the toxemia resulting from chronic or focal infection plays a very important rôle in the causation of these psychoses, and what is of more importance, that the eradication of such infection or, as we term it, the *detoxyication* of these patients, has a direct bearing upon the arrest of the mental symptoms, when such treatment is instituted early in the course of the disorder.

Out of this large group a few cases have been selected to show especially the relation of cause and effect. These are by no means isolated cases, an effort having been made to give examples of as large a variety as possible, in the limited space available.

Some are cited to show the rapid recovery after extraction of infected teeth or tonsils, or following abdominal operations for the eradication of infection, either in the intestinal tract or genito-urinary system. Others, to show the necessity for persistency and thoroughness in obtaining results, even after apparent failure from insufficient and inadequate detoxication. In some of the cases direct hereditary influences were present, but that in itself did not prevent the recovery of the patient following treatment. Two cases unsuccessfully treated

are also reported, to show the necessity for early treatment and also the somatic pathology and cause of death.

CASE 1: A married man, age 35, who had been a successful contractor with no evidence of mental trouble until November, 1917, when friends noticed that he acted in a peculiar manner. About Christmas, 1917, he suddenly disappeared and later was found in a hospital in Chicago in a confused state. He did not know how he got there and could give no account of himself during that period. He was brought back to Trenton and put in a general hospital for treatment by his physician. He seemed to improve a little and was taken out, but soon became very much worse; was depressed, agitated, confused, and self-accusatory. Admitted to the State Hospital March 17, 1918; he was extremely apprehensive, thought he was going to be killed and became rapidly worse. In May it was noticed that he had four crowned molars; these were extracted and two days following this the patient became normal. He lost all his apprehensiveness and depression and rapidly improved; soon gained over thirty pounds in weight. Stomach examination showed infection and autogenous vaccine was given. He was discharged June 9, 1918, following which he went to work as a contracting engineer, earning \$160.00 per month. His work was entirely satisfactory. He has shown no mental symptoms whatever since his discharge and at present (three years later) is a member of a prominent business concern.

CASE 2: Psychosis in a single woman; age fifty-five.

Family History: Father died of acute melancholia at sixty-four; mother of paralysis at eighty.

Personal History: The patient's infancy and childhood were normal. She had typhoid fever at twelve and was mentally upset for some months, probably delirium; since that time she had shown some inability to learn, but was a good housekeeper. Her mental trouble followed the death of her mother in August, 1916. She became excited, talkative, and in September was much depressed, agitated and self accusatory. She was admitted to the New Jersey State Hospital October 3, 1916. At that time it was noted that her upper teeth were

missing and that her lower teeth were badly decayed. Nothing was done for her, however, and she was transferred to the chronic ward. In September, 1918, eleven bad teeth were extracted. She improved rapidly during the next few weeks. On November 9, 1918, she was discharged as recovered and since that time has been perfectly well.

Our neglect to examine the teeth in this patient probably is responsible for her residence of two years in this Hospital, for there seemed to be no other infection, or any other physical disturbance except the infected teeth. It is interesting to note that the hereditary taint (*i.e.*, father suffered from acute melancholia, from which he died at the age of 64) did not affect the recovery of this patient.

CASE 3: Psychosis in a young Syrian girl, single, age 17, who was admitted to the New Jersey State Hospital at Trenton March 21, 1921.

Family History: Shows paternal cousin insane, otherwise negative.

Personal History: Negative. The patient started school at the age of four and continued until first year high school. For the past two years she has done clerical work and has given good service. She possibly had influenza in 1919. The onset of the psychosis was rather sudden, one month before admission and the cause given by the committing physicians was a "love affair." She became violent, excited and destructive, breaking windows and furniture. She was sleepless and had a poor appetite. Her parents thought she was working too hard. On admission, March 21, 1921, she was markedly disheveled in appearance and irrelevant and volunteered the information that her teeth hurt her.

Physical Examination: The patient was rather anemic and pale, somewhat under weight. The neurological examination was negative. There was marked fetor of breath. The abdomen was flat. She complained of pain over McBurney's point. Her teeth and gums were in bad condition and her tonsils were also infected.

Mental Examination: For a month after admission the patient continued in an excited condition; she was destructive

to furniture, loud and noisy, and very impulsive. She was untidy and paid no attention to herself, passing her excretions unnoticed in bed. Her conversation was irrelevant and much confused; apparently she reacted to hallucinations of sight. She refused food and had to be fed. Because of her condition it was necessary to seclude her in a single room. She was so excited and non-coöperative that X-rays could not be taken of her teeth. On April 19th, about one month after admission, the resident dentist, Dr. Fischer, diagnosed impacted third molars and the four were extracted under a general anesthesia. She slept quite well during the night and the next morning asked for Dr. Fischer to come in and examine her gums. This was the first relevant expression on her part since admission to the hospital. On this same day she asked permission to go to the bathroom and look after herself. There was a marked change in her conduct. She became quiet and orderly and fairly relevant in her conversation. On May 9th the patient voluntarily made the remark that since the "extraction of my back teeth I have felt entirely different," and she realized that from that time her improvement continued. On May 16th she was able to give a very clear account of herself. She recalled that she was noisy and excited and did not sleep for several days and had vivid visual hallucinations. She now realized that they were purely imaginary. The mental status taken at this time showed no evidence of confusion; the grasp on surroundings and data of personal identification were good. Her memory was good for both recent and remote events except for the first three weeks of her residence at the hospital. Her school knowledge and general experience were good; insight and judgment were perfect. She realized that she had had a serious mental attack.

This case distinctly shows the effect of impacted third molars in producing these peculiar confused mental states which so closely resemble dementia praecox. It is interesting to note that the tonsils had been removed nine days after admission without any effect upon her mental condition. The stomach examination showed very low hydrochloric acid and two types of non-hemolytic stpetococci. She was discharged

June 12, 1921, two months and a half after admission, although she had practically recovered immediately after her impacted and infected molars were extracted, one month after admission.

CASE 4: Psychosis in a married woman; age, twenty-two. Admitted to the Hospital, November 18, 1916.

Personal History: The patient was a capable, bright girl and successful stenographer. She was married August 1, 1915. Three months after her marriage she suffered from pains over her heart and had a general feeling of weakness. At this time she was seen in consultation by the writer; she had been in several hospitals. She showed no mental symptoms during this period. At the time of the consultation she was told, as her blood fixation test was positive for streptococcus, that she should have her teeth examined and the infected teeth extracted. This she did not do and in October, 1916, she became depressed and mute. She spent eleven weeks in a general hospital and was finally admitted here. She was in a mute, stuporous condition and extremely prostrated, merely nodding her head in answer to questions. She remained in this condition until June, 1917. With a great deal of difficulty several infected capped teeth were removed and later her tonsils were enucleated, following which she cleared up rapidly. On July 15, 1917 she was discharged as recovered. Since then she has remained in a normal conditions, gained physically and showed no evidence of mental trouble, until the spring of 1921, at which time she died following a difficult labor at the birth of her first child.

This case is interesting from the fact that, a year before the mental trouble developed, the patient was in a very weak physical condition, with marked heart symptoms, a condition recognized as the result of infected teeth, which she refused to have removed, and, as a result, finally developed a serious mental trouble, which cleared up when the infected teeth and tonsils were removed.

CASE 5: Psychosis in a widow; age, twenty-six.

Family History: Negative.

Personal History: Uneventful, except that she did not like school and stopped at 15 years when in the fifth grade. It would appear, therefore, that she was somewhat retarded, but

she claimed she did not like school. She worked as a waitress until she married, at the age of 18. She had had three children, the youngest is one and a half years of age. There was no mental trouble at the time of the birth of her children. Her husband died of influenza in 1918 and it became necessary for her to go back to work.

Onset of Psychosis: Very sudden, one week before admission. She became excited and abusive to the proprietor of the store where she worked and took her children away without knowing where she was going. She continued to be excited, lost sleep, spent her time praying and singing and refused to eat. The day of admission she seized her baby, ran out on the street toward the canal and was apprehended by an officer. She was admitted March 16, 1920, in a very confused state with marked maniacal symptoms.

Physical Examination: Anemic looking woman, poorly nourished. The neurological examination was negative. Her tongue was badly coated and her teeth infected. One impacted canine and six other teeth were extracted two weeks after admission. Her tonsils were found to be infected and removed one week after admission. The circulatory system was negative. Albumin was present in the urine. There was some laceration of the cervix. The Wasserman reaction was negative and the fixation test for non-hemolytic streptococcus was positive. A stomach examination by the Rehfuess method showed an entire absence of hydrochloric acid during the test and streptococcus mitis was isolated in the cultures.

Mental Status: The patient continued to be excited, noisy and destructive and very much confused, with evidence of hallucinations and delusions, until the removal of her tonsils, March 23, one week after admission. Following this she began to improve and on April 8 an impacted canine and later the six other infected teeth were extracted. She soon recovered and on May 7 was discharged.

This case illustrates the rapid clearing up of mental symptoms following the removal of infected teeth and tonsils. In combination with infection we must consider the prolonged worry over the death of her husband and overwork in earning

a living for herself and children. There was also a moderate degree of nephritis. The case could be classed in the manic depressive group.

CASE 6: Psychosis in a married woman; age, forty.

This patient had a neurasthenic condition lasting twenty years with profound physical disturbance and nervous palpitation of the heart. At twenty-five she had all her upper teeth extracted, which resulted in clearing up the nervousness and a gain of 20 pounds in weight. Seven years later she had rheumatism; two years thereafter (1909) she had imperfect action of the heart. *Diagnosis:* Valvular lesion with profound stomach trouble. She entered the New Jersey State Hospital as a voluntary patient. The blood test was positive for streptococcus. Radiograms of the patient's teeth showed one abscessed tooth; nine front lower teeth not definite. She refused to have teeth extracted and three months after admission was taken home, but was no better. Stomach and intestinal trouble continued. Cessation of menstruation occurred. Her only nourishment was white of egg and malted milk. She became very much depressed and was readmitted to the Hospital, November, 1917; at this time she weighed only 80 pounds. Under rest in bed and forced feeding, she gained in weight and her depression disappeared. After considerable improvement her nine lower teeth were extracted; all badly infected. Examination of her stomach, April 15, showed absence of hydrochloric acid and presence of streptococcus and staphylococcus. An autogenous vaccine was given; following this she gained 40 pounds in weight. In August, 1918, there was a return of physical weakness. She had to remain in bed, although she was clear mentally. Cultures from her tonsils gave streptococcus and her tonsils were enucleated, September, 1918. Five days following the removal of her tonsils the distress from heart lesion disappeared and it has not returned. The reaction of the stomach (October 7) showed normal hydrochloric acid and absence of infection. The patient was discharged October 22, 1918, since which time she has been working in the Medical Director's office in a clerical capacity.

In this case the mental condition cleared up, under rest in bed and forced feeding, before the removal of the foci of infection, but the patient still had a profound physical disturbance which did not disappear until all the foci of infection were removed.

CASE 7: Psychosis in a married man, age 53. Admitted February 24, 1916. His mental trouble followed "grippe" three months before admission. He had marked physical signs, and complained of his head hurting him. On January 18 he attempted suicide by cutting his throat, jumping out of the window and running in front of a trolley car. When first admitted he was in a semi-delirious condition. He was taken out against advice September, 1916. All infected teeth were removed prior to this. He remained at home, gradually becoming worse, until June, 1917, when he was readmitted. He was much depressed. He accused his wife of associating with other men and said he would never get well. His tonsils were found to be infected and were removed, but not much improvement was noted. In May, 1918, examination of his stomach showed a severe infection with absence of hydrochloric acid. He was treated with autogenous vaccine and improved rapidly. He gained considerably in weight and in October, 1918, was discharged as recovered. In this case the removal of the infection of the teeth and tonsils caused no improvement, which only occurred after autogeneous vaccines were given.

CASE 8: Psychosis in a married man, age 35.

Family History: Father and grandfather had depressed spells.

Personal History: The patient had been married eleven years, his domestic life was happy. In 1916 he saw service on the Mexican Border with the 71st Regiment. Following his military service—one and a half years prior to admission to the State Hospital in March, 1918—he had been treated in private sanitariums but became progressively worse. He was apprehensive, confused, refused food, had many somatic ideas and delusions regarding the disarrangement of his gastro-intestinal tract. He became very much confused, refused to talk and had to be fed. In April he had several infected teeth removed. Examination of stomach showed he had practically no hydro-

chloric acid, and streptococcic infection. He was given vaccine, and examination of stomach, June 17, showed normal hydrochloric acid but still some bacteria. He improved somewhat and was discharged September 21, 1918. Following his discharge from the hospital he showed rapid improvement and a letter from his mother in December, 1918, stated that he was entirely normal, had gone to work and was supporting his family. The duration of this case was one and a half years before admission during which time he was becoming progressively worse. After the removal of the infected teeth he rapidly recovered. The question of diagnosis is uncertain, but there can be no doubt that he was becoming progressively worse and fast going into a chronic state. The relation of this detoxication to his recovery can hardly be doubted.

A recent letter (1921) states that there has been no return of the mental symptoms, and that he continues to work and support his family.

CASE 9: Psychosis in a single German girl, age 22. Admitted to the New Jersey State Hospital at Trenton, March 30, 1918.

Family History: Negative, except that father had a stroke.

Personal History: Negative. The patient had a common school education, but was rather dull. At the age of 14 she began work as a sales-girl. She had been keeping company for two years with a young man who discontinued his visits six weeks prior to her admission. During the winter she caught a heavy cold and had an attack of articular rheumatism. She became depressed and this man was sent for, but when he came she was mute. At times she became emotional and asked forgiveness because she had disgraced the family. She said she was pregnant and this was found on examination to be true. Psychogenic factors in this case were pronounced; loss of her lover and worry over the disgrace of illegitimate pregnancy. There was also a history of exposure to cold and chronic infections.

Physical Examination showed a poorly nourished girl, weighing 100 pounds. There was evidence of marked toxemia. Her breath was foul, and her teeth were covered with sordes.

The patient was four and a half months pregnant. The urine showed a trace of albumin and indican. The spinal fluid was negative. The fixation test was negative for streptococcus, colon bacillus was not done at that time. In May, 1918, a seven months still-born fetus was delivered. She continued mute, resistive, apathetic, and indifferent, and was considered a chronic case. In November, 1919, enucleation of the cervix was done by Dr. Stone and a culture yielded a colon bacillus. On December 9, 1919, her tonsils were removed. She gradually improved following the tonsillectomy and enucleation of cervix, and on December 25, 1920, she had recovered sufficiently to go home.

This patient was gradually becoming worse until the operation upon the cervix to eliminate the infection was performed. Had this not been done she probably would not have recovered. Since leaving the hospital this patient has been earning her living; she has visited the hospital on numerous occasions, and no evidence of any psychosis could be observed.

CASE 10: Psychosis in a single girl of previous normal mentality.

Family History: Negative.

Personal History: The patient developed her first attack at the age of 19, while a student at the normal school. She was seen by the writer at this time and the disorder was considered the result of overwork. She was somewhat depressed and had rather vague ideas of unworthiness with a distinct religious trend. She was somewhat illogical and could see no reason why God would not let her live the last few years of her life over again so that she could correct her imaginary faults. She recovered from this attack after six months in the New Jersey State Hospital, and remained entirely well for six years. At that time no attempt was made to examine her for chronic infections and no psycho-therapy was used. It was simply an instance of spontaneous recovery, so frequently seen in the first attacks of these psychoses, probably the result of raising the immunity of the individual.

Her second attack occurred six years later and was characterized by the same symptoms as on the previous admission.

She was admitted as a voluntary patient, October 18, 1917, and her evident bad teeth were extracted, but no X-rays were taken of the remaining teeth. She was in very poor physical condition, somewhat anemic and considerably under weight (70 pounds). She read her Bible constantly and showed a marked religious trend. For over a year the writer saw her almost daily and frequently examined her mouth. Finally X-rays were made and four unerupted third molars were found. These were extracted and her infected tonsils removed. For a time she seemed better but soon relapsed into a state of apathy and indifference. An examination of the cervix was made and it was found to be infected; in September, 1919, it was enucleated by the Sturmdorf method. She failed to show improvement immediately, but soon began to gain in weight; in a few months this gain amounted to 70 pounds over her former weight, or 140 pounds. Accompanying this improvement in her physical condition was a decided change in her mental condition. She became alert and active; soon was given parole and was discharged in May 1920 as recovered. She did well at home but came back at the suggestion of the writer for further examination as there was evidence of some intestinal trouble. This proved not to be of such severity as to warrant surgical measures and after working as an attendant for some months she returned home. She has shown no mental symptoms since she recovered after the enucleation of the infected cervix.

CASE 11: Psychosis in a married woman, age 31.

Family History: Negative—One sister was nervous and one brother had rheumatism.

Personal History: Uneventful. The patient's childhood was normal. She left third year high school at the age of 15. She was married at 19 and had three children. At the age of 27 she had her *first attack* of mental trouble, and spent six months in a private institution in Colorado and two months in another in Minnesota, from which institutions she was discharged as recovered. In 1916 she had a *second attack* and after six months in the Colorado State Hospital was discharged as recovered. In October, 1918, following an explosion of a powder plant in the vicinity of her home she developed the

third attack of a maniacal nature and was admitted to the New Jersey State Hospital at Trenton, on October 16, 1918. At the time of her admission she was noisy, excited, irrelevant and in a typical maniacal state.

Physical Examination: Showed a well developed, well nourished female, weight 128 pounds. The neurological examination was negative. Her teeth were in fair condition except that all the lower molars were missing. Two teeth were extracted here. Her tonsils were found to be infected and were removed at this time. Heart and lungs were negative. Her blood pressure was normal. A pelvic examination showed a deeply lacerated and infected cervix. The Rehfus stomach test at this time showed a fair hydrochloric acid content and streptococcus and colon bacillus from cultures. Streptococci were also found in the duodenum. Lumbar puncture was negative. She recovered rapidly from her typical maniacal excitement a few weeks after the infected teeth and tonsils were removed and was discharged March 2, 1919, in a normal mental condition. Her husband stated that she was as normal as he had ever known her and much better than during the interval between her attacks. Because of the infected cervix the patient was not considered recovered and the husband was told that this had better be attended to but he decided to remove her without the operation.

She remained well for a year but was re-admitted May 21, 1920, at which time she was in a hypo-manic state, but not nearly so excited as on her previous admission. It was found necessary to extract seven more teeth and an examination of her tonsils showed that there was considerable infected tonsillar tissue remaining. On October 19, 1920, the cervix was enucleated (Sturmdorf method), after which the patient recovered rapidly. On the 31st of October, 1920, she was discharged as recovered. Reports received up until June, 1921, state that there has been no return of her trouble; that she is normal in every way.

This case illustrates the persistence necessary in removing chronic foci of infection, and also the persistence of the infection even when the patient recovers spontaneously, as in this

case, from two previous attacks. The tendency for patients with chronic infections to develop their own immunity is very strong and accounts for the spontaneous recovery of 37 per cent of the "functional group," but this does not mean, as shown in the above case, that the infection has been eradicated. Unfavorable factors will reduce the immunity of the patient, allow the infection to become active again and thereby cause a return of the mental symptoms.

X-ray studies of the gastro-intestinal tract in this patient showed the possibility of a lesion in the colon which may or may not prove serious enough to produce another attack.

CASE 12: Psychosis in a married woman, age 27.

Family History: Negative except that husband states that her family are "religious fanatics."

Personal History: Early development normal. The patient was married at 18 years of age and has had two children. The first attack of depression followed the birth of a child some years ago. Two years previous to admission at the New Jersey State Hospital, March 3rd, 1919, she was in a private sanitarium for six weeks with an attack of depression. The onset of the present attack was rapid. The patient has suffered from headaches, vertigo, bilious attacks and constipation. At the time of admission she was partly oriented and expressed marked paranoid ideas.

Physical Examination: Showed a well nourished woman. Her teeth were in very bad condition and eight had to be extracted. The tonsils were badly infected, though small, and were enucleated March 21st. The examination of the stomach showed moderate hydrochloric acid and streptococcus infection. A pelvic examination showed lacerated perineum second degree, slight rectocele and cystocele, cervix lacerated and infected.

Mental Status: She continued very much depressed and at times quite emotional. There were hallucinations of hearing present, paranoid ideas in regard to her sister. There were marked self-accusations; the patient thinks she has been called upon by God to sacrifice her life for others. This idea is probably the result of auditory hallucinations and is firmly fixed.

She reacts to the same by endeavoring to take her life and only with great difficulty is prevented from doing so by the nurses. On April 3 enucleation of cervix was performed and the lacerated perineum repaired, and for a week following her condition remained unchanged. Following this she began to improve and on June 13, 1919, she was discharged as recovered and has remained so ever since.

The infection of the cervix in this case apparently was a very important factor.

CASE 13: Psychosis in a married woman, age 32.

Family History: Mother and sister said to be "probably neurotic."

Personal History: Early development normal. The patient went to school until the age of 17. She later became a stenographer. She was married at the age of 19, and has one child, ten years of age. Psychogenic factors which were considered the cause of her attack in 1913 were as follows: First, trouble with her husband's family with whom she was more or less at odds. Second, trouble with a neighbor who was also a mother-in-law and was hostile toward the patient because she entertained her son's wife. Third factor, contemplated visit of a sister-in-law. Her first attack occurred at the age of 24, and was depressive in character, lasting four months. The second attack occurred rather suddenly on December 26, 1912, one day previous to the arrival of her sister-in-law, and the maniacal symptoms continued to grow worse until it was necessary to admit her to the New Jersey Hospital at Trenton on April 3, 1913.

Physical Examination: At this time, nothing unusual. *Mentally* the patient showed marked exhilaration and at times irritability, using threats and curses. She was somewhat erotic and took pleasure in exposing herself. At times she was inclined to be violent. She cleared up without any special treatment and was discharged June 15, 1913. For a while after going home she seemed to be fairly well, but soon developed mild attacks of elation, alternating with depression, and was never quite normal, although the symptoms were not severe enough to return her to the hospital.

The third attack, in which she had to be re-committed to the hospital, began in March, 1920. She was admitted to the hospital June 11, 1920, three months later. A year previously she had a severe attack of influenza after which she steadily lost in weight. She came to the hospital as a voluntary patient in a somewhat disheveled condition. She was excited and restless and laughed in a silly manner.

Physical Examination: Showed a poorly nourished white woman. Neurological examination negative. Four teeth were found to be infected and were extracted. Her tonsils were found to be infected and were removed three days after admission. The same type of streptococci (mitis) was found in both teeth and tonsils. The stomach examination (Rehfus method) showed almost a complete absence of hydrochloric acid during the test, with streptococcus in the cultures (non-hemolytic types, fecalis and equinus).

Mental Examination: The patient exhibited a typical maniacal reaction for a week after admission, but following the removal of her infected tonsils and extraction of infected teeth she improved rapidly and was discharged July 24, 1920, six weeks after admission, as recovered.

The patient's history since leaving the hospital shows that she is entirely well and from both her statements and those of her husband it is evident that her condition is much better than it has been since the onset of her trouble at the age of 25.

It is interesting to note the factors considered in the first attack, i.e., environmental in character, trouble with her husband's family, a neighbor, and contemplated visit of her sister-in-law. Because the mother and sister were "probably neurotic" heredity is considered as an etiological factor and consequently the patient was "defective constitutionally." The assigned cause by the committing physicians was "overwork and death of mother." While these factors may be important, it is evident that the chronic infections of the teeth, tonsils, and stomach were far more important than the psychogenic factors. The fact that she recovered spontaneously from her previous attacks does not rule out the rôle of chronic infections as an etiological factor, for these were merely latent in the interval,

due to the raising of the patient's immunity by hospital treatment. This immunity was again broken down and the third attack was the result.

CASE 14: Psychosis in a white woman, 48 years of age, single, American, a nurse.

Family History: Paternal grandfather committed suicide. Mother died during an attack of depression, diabetes. One sister had an attack of depression, at the age of 50, but she recovered. Brother was a physician and also had an attack of depression at one time.

Personal History: Uneventful. She had been an exceptionally bright girl. She was very conscientious and took excellent care of her mother for over a year before she died. The onset of her psychosis followed the death of her mother about three and a half months before admission, Jan. 31, 1919. She became very much depressed, had a poor appetite and lost considerable weight. She also was sleepless for a month. Cessation of menses had occurred three months previously. Her sister became depressed at the same time and had to be taken to a sanitarium.

Physical Examination: At the time of admission a poorly nourished woman, weight 80 pounds. Neurological examination negative. She complained of indigestion and constipation. X-rays showed many badly infected teeth; her tonsils were pronounced normal. The stomach examination showed a fairly normal hydrochloric acid and streptococcus cultures. In February three infected teeth were extracted. Gynecological examination showed a much enlarged uterus and a mass on the left side.

Mental Status: The patient was restless, apprehensive, and walked the floor continually, usually without shoes and stockings and clad only in a nightgown. She had constant self-accusatory delusions, believing that she had caused all the suffering in the world, all the operations in the hospital, all the shortage of food, that she was without money, clothes or food. She was very much agitated. This condition continued about the same and in March, 1919, exploratory laparotomy was performed. Radiographic studies of the colon had indicated some

retention in the caecum, but at the time of the operation the uterus was found to be soft and boggy and the left tube closely adherent to the sigmoid, the result of an old inflammatory process. The uterus, tubes and ovaries, and also the appendix were removed. Cultures from the uterus, streptococcus, from the cervix, b. coli, and the mesenteric glands, b. coli. There was no improvement following the operation and later the patient was given ten doses of anti-streptococcic serum in ten c.c. doses. In about a month following this treatment she began to improve and on October 19, 1919, was discharged as recovered. At present (June, 1921) she is entirely normal and has had no return of her mental symptoms.

This case again illustrates the combination of factors in causing a psychosis. There was marked heredity, overwork, worry and grief, the death of her mother occurring at the menopausal period, coupled with infection of the teeth and gastrointestinal tract, uterus, tubes and ovaries. The type of psychosis would formerly have been classed as involutional melancholia with marked agitation and apprehensiveness. It is also interesting to note that even with the removal of the foci of chronic infection, which was especially marked in the uterus (which is unusual), there was no recovery until after the administration of anti-streptococcic serum.

CASE 15: Psychosis in a single woman, age 44, who was transferred to the New Jersey States Hospital at Trenton, May 14, 1918, from the State Hospital at Morris Plains, where she was admitted December 23, 1908, and remained for ten years prior to her admission here.

Family History: Negative.

Personal History: Not unusual except that the patient had been more or less sickly. The patient had an attack of pleurisy when she was a girl, which developed into empyema. The onset of her mental trouble was gradual, beginning at the age of 25, nine years before admission to the Hospital at Morris Plains. The symptoms during the nine years previous to admission were somewhat vague. It was stated she had a religious mania, was very quarrelsome and would frequently wander away from home in a very confused state. At one time she went as far as

ten miles. On admission to the Hospital at Morris Plains she was somewhat resistive and seclusive. She took no interest in her surroundings and showed no desire for employment or amusement. She never talked with other patients and was very asocial. There was no improvement in her mental condition, she continued dull and apathetic. She worked in the dining room at times and made her own bed. She frequently shouted at night and her language was very profane; at times she was violent.

When admitted to the New Jersey State Hospital at Trenton, May 14, 1918, she was dull, apathetic, indifferent, considered a chronic case of 19 years' duration. A diagnosis of dementia praecox, but without marked deterioration, was made.

Physical Examination: Showed very bad teeth and eleven were extracted. Her tonsils were pronounced normal. A stomach examination showed low hydrochloric acid content and colon bacillus in cultures. Autogenous vaccine of colon bacilli was given. Pelvic examination showed large abdominal mass somewhat movable and easily outlined. This mass filled up the strait of the pelvis. Exploratory laparotomy was done February 8, 1919, and a long oval mass was found in the pelvis. A large amount of straw-colored free fluid was found in the peritoneal cavity. The growth involved the body of the uterus extending down in the upper segment of the cervix. The surface of the growth contained a number of nodular excrescences varying in size from a ten-cent piece to a quarter. A cystic ovary was found embedded in the right side of the tumor. The growth was extremely vascular and was removed with the uterus and cervix. Appendix was also removed.

The patient made an uneventful surgical convalescence, and on February 22, thirteen days after the operation, it was noted that she was up and about the ward, quiet, coöperative, caring for her own wants and helping with the other patients. She gradually improved mentally and in July, 1919, she had recovered sufficiently to be discharged. Since that time the patient has visited the hospital on several occasions and examination failed to demonstrate any evidence of any psychosis, and her father stated that she is perfectly well and able to take care of her household duties.

It is very difficult to classify this case or to determine fully the causative factors. She had suffered from a psychosis of nineteen years' duration, ten years of which was spent in the Morris Plains Hospital. Her recovery followed the removal of infected teeth, but more especially the removal of the growth in the uterus and cervix. She evidently was not deteriorated mentally for such deterioration would preclude recovery.

CASE 16: Psychosis in a married man, age 32. Occupation, telegraph operator.

Family History: His maternal grandmother was insane for some time previous to her death. One brother died at the age of 48 of pulmonary tuberculosis.

Personal History: The patient's early development was normal. He reached the seventh grade at the age of 14 and began work as a telegraph messenger boy, became an operator, and worked as an operator for 13 years. He married at the age of 19, and has two children. Seven years prior to admission he was supposed to have contracted syphilis from his wife, on account of which they separated. Since that time he has not held a position longer than three months at a time. For six months he was in the United States Army (in 1915). His first attack occurred in 1913 and he was committed to the St. Lawrence State Hospital, New York, where the following diagnostic summary was given: "In this case we have a psychosis of gradual onset beginning in a man now 24 years of age, in whom we have a history of some shut-in tendencies although these are not marked. The psychosis is characterized by active auditory hallucinations, vague unsystematized persecutory ideas with no attempt at rationalization; emotional tone predominantly one of indifference with an occasional uncalled for surliness; a mood not in accord with the ideas expressed; the lack of contact—all in the presence of a clear sensorium. Diagnosis of dementia praecox, hebephrenic form was submitted and confirmed at staff meeting."

He was discharged from this hospital June 6, 1914, and later enlisted in the United States Army where he had trouble with the officers and was returned to the above hospital. While there he was surly and disagreeable, had the delusion that he

could read other people's minds and that other people could read his, even when they were a long distance away. No other persecutory ideas were elicited and hallucinations were denied. Orientation and mental grasp were unimpaired. The same diagnosis was made at this time. He was discharged from the St. Lawrence State Hospital March 27, 1915, as improved.

Little is known of his condition following his discharge from the above hospital until a few days before his admission to the New Jersey State Hospital, July 11, 1918. He had contracted gonorrhea and suffered from acute orchitis and was found wandering aimlessly about the streets praying to be protected from imaginary enemies, eating horse-manure which he carried in his pockets. He was unable to give any data concerning himself and was taken to the Perth Amboy Hospital and treated. While in the hospital he was irrelevant, incoherent, and unclean in habits, and had to be committed here. On admission the patient showed a mild degree of apprehensiveness, depression, and mental confusion. His conversation was irrelevant and incoherent. He admitted hallucinations that good and evil spirits talked to him, good in one ear, evil in the other; that George Washington often spoke to him and that he was under his influence and protection. He had marked delusions of persecution and thought enemy aliens were following him and seeking to take his life. He showed some evidence of deterioration, and had absolutely no insight into his condition.

Physical Examination: The pupils were somewhat irregular, reflexes—knee jerks diminished. There was marked loss of coördination of the muscles of the extremities. Because of the history of syphilis, paresis was suspected, but the spinal fluid proved negative (cells normal and globulin negative), the Wasserman reaction of the blood and spinal fluid was also negative. His breath was foul, his tongue coated, and his teeth were in bad condition. Several had to be extracted. Tonsils were found to be infected and removed January 20, 1919. The stomach examination showed a fair amount of hydrochloric acid, cultures showed colon bacillus and culture of the duodenum streptococcus. The patient remained the same until

December, 1919. Examination by Dr. Frederick Smith revealed the presence of seminal vesiculitis and the vesicles were removed under a general anaesthetic, by Dr. Smith.

Following this operation the patient steadily improved; by May, 1920, he was in a normal condition and was discharged, recovered. It is evident that the seminal vesiculitis played a very important rôle in this case from the fact that for nearly two years he presented the typical picture of a deteriorating psychosis, without any sign of improvement. He had the delusion that his food was poisoned, and often refused to eat, and reacted constantly to hallucinations of hearing. He was indifferent and constantly complaining of his persecution in the hospital. Within a short time after the removal of the infected vesicles, he became active, interested in his surroundings, and his hallucinations and delusions disappeared. He developed insight into his condition and when he left the hospital no evidence of any psychosis was present. Since leaving the hospital reports from the patient's family state that he is perfectly well and better than he has been for years. In fact, a recent letter from his sister, one year later, June, 1921, states that he has been steadily employed at his profession as a railroad telegraph operator and is at present taking a course in typewriting to assist him in his work.

CASE 17: Psychosis in a married man, age 42.

Family History: Negative.

Personal History: Not unusual. The patient had a good education and by occupation was a printer. He worked for one firm for twenty-one years. He used no alcohol. He married at the age of 39 and has two children living and well. A previous attack occurred thirteen years ago, the exact nature of which is not known, from which he recovered in about eight months. He was admitted to the New Jersey State Hospital at Trenton on June 25, 1918. The onset of his trouble dated from the death of his mother and uncle in December, 1917, six months previous. He became somewhat seclusive, refused to talk much to his wife and remained in the house. He developed various absurd delusions, thought he was being "framed-up,"

that the police were after him, and that he was being followed by secret service agents because he was a counterfeiter.

Physical Examination: Neurological examination negative. There are many capped teeth and bridge work, his tonsils were reported normal. Ten infected teeth were extracted.

Mental Status: On admission the patient was quiet and cooperated with the hospital routine. He was soon transferred to a front ward and given parole of the grounds which he did not abuse. He gave an account of his trouble as follows: On the death of his father he was made executor of the will and began to worry over this. As he had been known as "Harry" R— and was named in the will as "Henry" R— he thought this was a "frame-up" to "do him" out of his share. He had auditory hallucinations and ideas of reference. He thought the police and secret service men were after him because he was suspected of being a counterfeiter. He was somewhat excited and apprehensive when admitted. He improved a little after admission, but still retained his delusions and auditory hallucinations. He was removed from the hospital July 18, 1918, against advice of the physicians, as slightly improved. After leaving the hospital he became much better and went back to work, but because of recurrence of his trouble a year later he was re-admitted on voluntary papers, January 28, 1919. This time he appeared somewhat depressed and showed the same delusions of persecution as on previous admission. Another infected tooth was extracted and infected tonsils were removed. Examination of the stomach (Rehbus method) showed only moderate hydrochloric acid content and streptococci and colon bacilli were found in both the stomach and duodenum. For this he was given an autogenous vaccine. He showed marked improvement after receiving the vaccine treatment and on March 19, 1919, two months after admission, it was noted that he had good insight into his condition, realized that his ideas were imaginary and wanted to go back to work. He was discharged on this date as recovered. On July 5, 1921, he was visited by the social worker who reported that the patient has entirely recovered, has worked steadily at his trade of printer and has shown none of his former symptoms.

This case illustrates the relation of infection to paranoid states and is one of many which have been successfully treated in the last few years. His improvement after the extraction of the infected teeth was very marked, but because the infected tonsils were overlooked and the gastric infection not treated he had a return of his symptoms. Recovery followed the elimination of these infections.

CASE 18: Psychosis in a single girl, age 17.

Family History: Negative.

Personal History: The patient was born in Russia, but has been in the United States for the last 15 years. Her early development was normal. She was graduated from the public schools and was considered exceptionally bright. The onset of her psychosis was gradual, three months before admission. The patient's father had lost money and she tried to make money by writing songs. These were not accepted; this worried the patient considerably. She developed insomnia. The songs she was composing kept recurring to her as she lay awake. She complained of vertigo and buzzing noises in her ears. She got no relief from this condition, soon developed marked agitation and apprehensiveness, begged for poison and asked to be killed. On several occasions she made attempts at self-injury and was abusive to her parents at various times.

She was admitted to the New Jersey State Hospital March 8, 1918, at this time she was quiet and orderly and signed a voluntary admission paper.

Mental Examination On Admission: The patient was very reticent and negativistic, and showed a decidedly sullen attitude. There was marked confusion and retardation; thirty seconds usually elapsed between question and answer. The lips were held tight, approaching the typical "Schnautzkrampf." She took no interest in the examinations and her orientation was somewhat defective. On account of her negativism and refusal to answer questions very little could be learned as to her memory and degree of intelligence. Insight and judgment were defective. This condition of negativism alternated with periods of excitement of a maniacal type with reaction to hallucinations.

Physical Examination: Neurological examination negative. Teeth were in bad condition. Tonsils enlarged and infected. Pharynx congested. Blood pressure normal. Heart and lungs normal.

Treatment: All of the remaining upper teeth were extracted soon after admission, but with no results. The tonsils were removed. The stomach examination, July, 1918, showed a normal hydrochloric acid content and streptococci and colon bacilli were isolated from cultures. On November 7, 1918, exploratory laparotomy was performed and the appendix removed with both ovaries and tubes. It was noted at this operation that the mesenteric glands throughout the small intestine as well as the colon were enlarged. Cultures taken from these glands showed abundant streptococci and colon bacilli. The finding of these organisms in the mesenteric glands determined the subsequent treatment. She was given five doses of anti-streptococcic serum at three days' interval, 10 c.c. at a dose. Following the administration of the serum the patient improved rapidly. The maniacal excitement subsided and in less than a week she was in a normal mental condition. On January 25, 1919, because of the condition of the colon found at the previous operation, it was decided to operate again and an illeostomy was performed. It is interesting to note that the mesenteric glands which were described in the first operation showed decided change in their character. Many of them were small and hard and showed marked regressive changes; some of them had undergone calcification. Cultures taken from these glands at this operation were sterile. We considered that the changes in the glands were due to the administration of anti-streptococcic serum. The ileostomy remained open until July 5, 1919, when it was closed. On July 27 the patient was allowed to go home on a trial visit in care of her aunt as she had entirely recovered mentally.

After leaving the hospital the patient continued to improve and frequently reported at the institution. She took a course in stenography and later qualified as a stenographer and typewriter; since then she has been continually employed at this work.

This case is important because of the fact that it was the first case in which we were able to obtain streptococci and colon bacilli from cultures of the mesenteric glands and therapy based upon this knowledge, that the enlarged glands contained living organisms has proven successful in not only this case but many others. This patient recovered immediately after the administration of anti-streptococcic serum and since then all operative cases have received anti-streptococcic, as well as a later developed, anti-colon bacillus serum. The diagnosis in the case is uncertain. On admission the diagnosis of dementia praecox was made upon the gradual onset with negativism, indifference and apathy. Later typical maniacal symptoms developed and the patient could be considered in the manic depressive group. The important fact in the case was the presence of multiple foci of infection which were eliminated by operative procedures and the administration of specific serum, with complete recovery.

CASE 19: Psychosis in a young married woman, age 28, admitted June 21, 1920. She had had one child. Her attack of maniacal excitement came on suddenly a few days before admission. She had very badly infected teeth and all of them were extracted, and her infected tonsils removed, with no apparent amelioration of the mental symptoms. She was too excited and uncoöperative for radiographic studies of the gastro-intestinal tract, but a history of habitual constipation since early childhood caused us to suspect involvement of the colon. The fact that the administration of autogenous vaccine and anti-streptococcus and colon bacillus serum had no appreciable effect, also substantiated this opinion. She was operated upon on December 16, 1920.

When seen a few days before the operation she was very much excited and refused to keep her clothing on. She had torn up a blanket and had it draped Hawaiian style about her, and claimed she was an Indian chief. She had had to be kept constantly in a room. She had had a special nurse in the hope that this would help her, but without avail. She was good natured, but at times inclined to be violent. Considerable concern was felt about her post-operative care as it seemed im-

possible that she would remain quiet and not disturb her bandages.

At the operation the colon was found to be badly involved and a large segment was removed. Contrary to expectations, while she was restless the first day and night, the next day she seemed quiet and asked that her hands be untied, as they were tied with gauze bandages in anticipation of trouble. This was done and from that time to the present she has shown a normal attitude. Her mental condition cleared up and in less than a week the change from her previous mental state was remarkable, to say the least. At present, nine months after operation, she is normal in every respect.

To explain the sudden cessation of her symptoms by the effect of the anaesthesia seems absurd, but those who doubt these theories have actually advanced such an explanation. If all mental symptoms could be made to disappear by the simple method of administering an anaesthetic how simple the whole problem would become. That the anaesthetic should not be given the credit in these cases, when the symptoms disappear after such an operation, is proven by the fact that many similar mental conditions persist in patients even after the operation and disappear only after the administration of autogenous vaccine or anti-streptococcus and colon bacillus serum, or not at all.

The necessity for developing specific vaccines and sera for use in these cases resulted from culturing the much enlarged mesenteric lymph nodes or glands found at operation. (See Fig. 28.) Various strains of streptococcic and pathogenic colon bacilli were isolated from these glands. As has been stated, when the infection of the colon is limited to certain areas which can be safely removed at operation it has been observed that the mental symptoms, in certain types may almost immediately disappear. We are not unmindful that these cases belong to the acute type and are apt, therefore, to exhibit the phenomenon of spontaneous recovery. From experience it is known that cases presenting maniacal symptoms furnish the greatest proportion of such recoveries, but at least 17 per cent of this type



FIG. 28A. Enlarged glands in the mesentery of the jejunum or upper part of the small intestine.

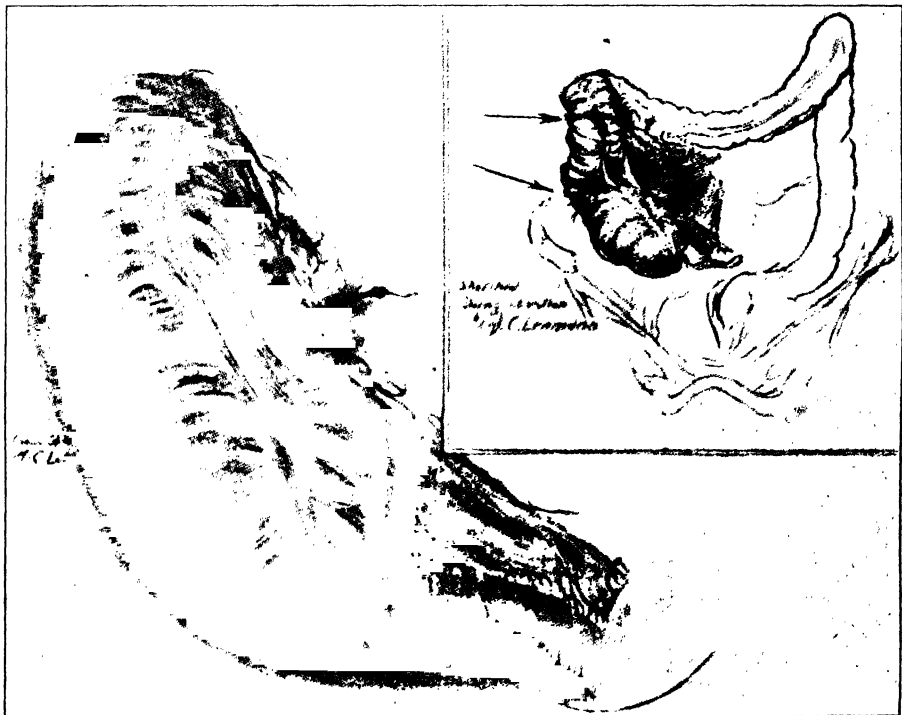


FIG. 28B. Bands of adhesions causing typical "elbow deformity" of the cecum which is enormously dilated, the inner lining showed ulcerations and a thinning of the muscular coats. This condition causes inhibition of peristalsis, and absorption of the highly toxic contents of the bowel. Detail in upper right hand corner.

become chronic when untreated. It is also known that a majority are apt to have a recurrence later on.

CASE 20: Psychosis in a single woman aged 28.

Family History: Negative.

Personal History: Uneventful. The patient had normal mentality; she reached her first year high school at 14, and was considered capable and efficient. In January, 1920, she had a severe attack of influenza and following this she became depressed, expressed ideas of her own unworthiness, thought she was not as accomplished as her fiancé, and imagined that her sisters did not care for her as much as formerly. The onset of the acute symptoms was sudden on July 14, 1920. She accused her lover of having caused a light to annoy her and reacted to auditory hallucinations (false hearing). She lost her appetite, developed insomnia, was decidedly negativistic, and talked in an incoherent manner. She was admitted to the New Jersey State Hospital July 17, 1920, three days after the onset. On admission she was active, noisy and excited and had to be put in a single room; a special nurse was provided by the family. She refused food and was very weak. At times she was very destructive and violent, tearing her clothes and striking the nurse.

Physical Examination: Somewhat pale, anemic woman, well developed and fairly well nourished. Neurological examination, negative. Circulatory organs negative. Blood pressure 118 systolic, 75 diastolic. The teeth were in poor condition; one impaction, three capped molars and twelve other teeth were extracted, under a general anaesthetic, without any improvement in her mental condition. Her tonsils were found to be infected and were removed two days after her admission without any effect. A stomach test by the Rehfus method showed fair hydrochloric acid content; two types of non-hemolytic streptococci (salivarius and mitis) were isolated from a culture.

Mental Status: The patient exhibited a typical manic reaction, irrelevant stream of thought, marked distractability, flight of ideas and playfulness. She would not keep any clothing on and at times was cheerful, good-natured and exhilarated

and at others negativistic and obstinate. She reacted to auditory and visual hallucinations and spoke of X-rays being played on her. She also spoke of being the devil. These ideas were more like transitory manic productions and not fixed ideas. Orientation, memory, and data of personal identification could not be obtained because of her playfulness and refusal to answer questions. She refused to coöperate in any way and it was only with great difficulty that X-ray studies of the gastro-intestinal tract were made.

Subsequent History: She continued in this manic state, showing no improvement from July, 1920, to January, 1921, in spite of the fact that her infected teeth and tonsils had been removed and she had had autogenous vaccine and ten doses of anti-streptococcus and anti-colon bacillus serum. The X-ray studies of the gastro-intestinal tract showed well marked pathology, and on January 21, 1921, exploratory laparotomy was done. The caecum was found to be somewhat larger than usual and a band of thick adhesions constricted the caecum at the hepatic flexure. There was some evidence that this was a congenital malformation. The mesenteric lymph nodes were enlarged in the region of this constriction. The sigmoid was rather dilated and thinned out, but no enlarged glands were found. The caecum and part of the transverse colon and terminal ileum were resected. On opening up this resected portion of the caecum abundant pathology was found, consisting of chronic ulcerated patches, marked thinning of the wall and destruction of the muscular coat. Cultures from the mesenteric gland showed non-hemolytic streptococcus, salivarius type.

The patient began to improve mentally a few days following the operation. She coöperated in every way and within a week was practically in a normal mental condition. She developed a mucous colitis with some discharge of blood which was controlled by symptomatic treatment. Her surgical convalescence was uneventful, and on February 26, a little over a month after the operation she was discharged as recovered. She has visited the hospital several times since then, and reports from the family state that at present (June, 1921) she is perfectly normal and shows no evidence of a return of her psychosis.

This case can be compared to case 19. Both patients were admitted about the same time in a similar maniacal state, and no results followed the elimination of infected teeth and tonsils or the administration of specific serum. Both of them recovered promptly after resection of the infected caecum and we would emphasize the necessity for resecting the colon in these cases as shown by the marked physical and mental improvement following the operation.

CASE 21: A young married woman, who suddenly developed a maniacal attack following childbirth, was admitted to the State Hospital at Trenton a few days later, March 7, 1918. She was so excited that it was impossible to make a proper physical examination. Her infected teeth were extracted under ether, but no results were apparent either from the ether or from the extraction of the teeth. A badly lacerated cervix was excised and perineum was repaired, and again ether was administered but no effect whatever was noted in her mental symptoms. After a year's residence in the hospital her right colon was removed and still no result. She continued wildly excited and actively hallucinated, talking to imaginary people.

Finally, she was given ten doses of 10 c. c. each of an anti-streptococcic serum and after the fourth dose she began to improve and after the tenth dose she recovered. In this case it seemed as if all efforts were to be of no avail, but persistence at length won out. She has remained normal since the fall of 1919. After her recovery she visited the hospital and at her own request had her infected tonsils removed as well as all her remaining infected teeth.

This case, and many others like it, must suggest to those who are open minded, yet conservative, that toxemia caused the symptoms, since detoxication of the patient resulted in the cessation of the symptoms.

CASE 22: Single man, age 28, son of a college professor, family unusually bright and highly intellectual, brothers successful lawyers. Patient well educated, graduated from college in 1900. Taught school for three years, a graduate of the Harvard Law School in 1915, admitted to the bar. Began to show mental symptoms in 1916; had auditory hallucinations, could

not get along well with his colleagues, became vacillating and inefficient. For a while he worked with pick and shovel so as to live more out of doors. Suspicious of everyone. Heard people accusing him of masturbation. Admitted to Mercer Hospital April 13, 1918, at which time he was silly and dilapidated. Spent his time indolently in bed and frequently exposed himself to the nurses and other patients. From the symptoms, at this time, with hallucinations and dilapidation, a diagnosis of dementia praecox of two years' duration was justified. *Physical Examination:* Underweight. Neurological examination: Negative. Six teeth showed very marked apical abscesses. Although the upper teeth did not show distinct abscesses in the radiograms they were found to be infected; all the upper and lower, except 6 front teeth in the lower jaw were extracted.

Examination of stomach (Fig. 29) showed absence of hydrochloric acid and from the cultures streptococcus viridans and colon bacillus were isolated and an autogeneus vaccine of these organisms was given. Improvement was rapid. He gained in weight, soon lost his silly and dilapidated appearance and talked rationally. In July 1918 tonsils were removed. He had a mild relapse, reappearance of hallucinations with some physical disturbance and fainting attacks. He was discharged November 5, 1918, and remained at home a year. He obtained a clerical position at \$150 per month which he filled satisfactorily. About a year later, although still able to work, he had occasional hallucinatory episodes. X-ray and physical examination revealed a lesion of the colon. He returned to the hospital and developmental reconstruction of the colon was done. His surgical convalescence was uneventful and he returned to his work. On account of industrial conditions in the spring of 1921, he lost his position, although he had given satisfaction as an accountant. His mental condition can best be shown from the fact that he was able to prepare for and pass with credit the bar examination in New Jersey. He also prepared for the Encyclopedia Britannica an abstract of the laws enacted in the state during the past decade.

The outcome of this case is all the more remarkable because

FIRST TEST: APRIL 5, 1918. SECOND TEST: MAY 28, 1918. THIRD TEST: JUNE 10, 1918. FOURTH TEST: OCT 7, 1918.

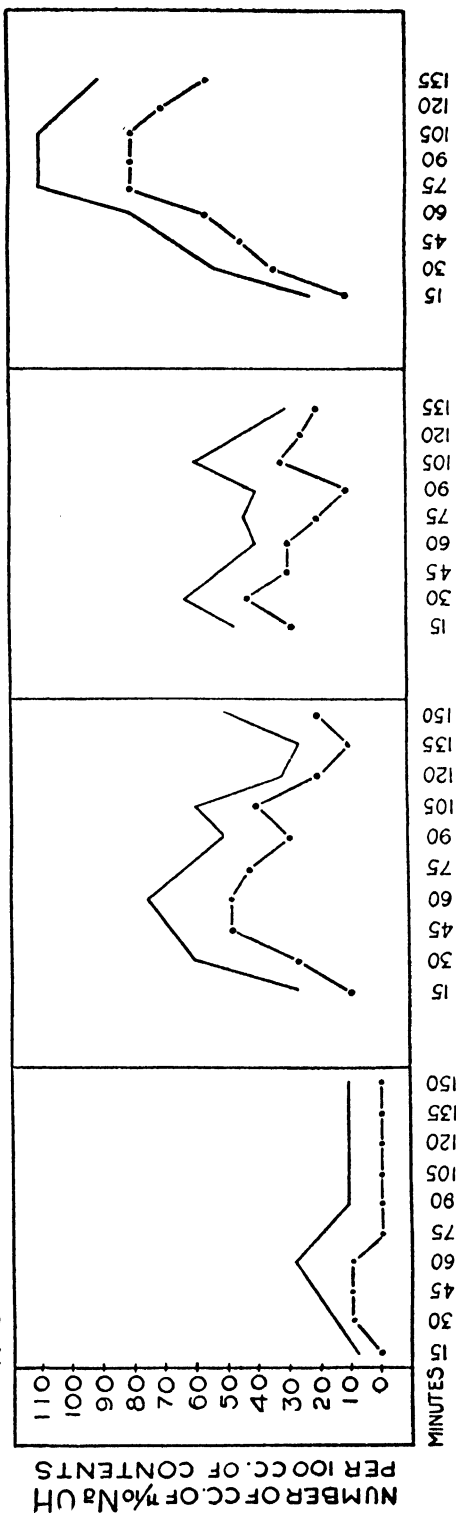


FIG. 29. Curves showing range of gastric acidity on April 5, May 28, June 10, and October 7, 1918.

Culture tests. April 5: stomach—streptococcus, B. coli and staphylococcus. May 28, June 10 and October 7: no growth (duodenum also negative, October 7).

— = total acidity
- - - = free HCl

of the fact that he had been unable to do any sustained mental work for two years prior to the spring of 1918, at which time he came under treatment. At that time he was in a very confused mental condition, and presented the classical symptoms of dementia praecox of a somewhat advanced stage.

CASE 23: Psychosis in a colored woman, married, age 31.

Family History: Her mother has been insane for 6 years. Maternal grandmother insane. The type of mental trouble is not known.

Personal History: Negative. The patient graduated from grammar school at the age of 21 and worked as saleswoman for two years. She married at the age of 23 and had five children, all living and healthy. The last child was born May, 1919. Previous attacks occurred during all her pregnancies. She was very nervous and excited, especially at the third or fourth month, but did not develop a definite psychosis until November, 1916, when following the birth of a child she had a maniacal attack, which lasted three months. The second attack occurred in May, 1918, following the birth of her last child and lasted five months.

Present Attack: This attack began two months before the birth of her baby in May, 1919. She was noisy, and destructive, lost interest in her household, neglected her children and refused to clothe herself properly. She had peculiar visions with ideas of wealth. She was admitted to the New Jersey State Hospital July 30, 1919, and at the time of admission was disoriented, showing marked exhilaration, and flight of ideas; she talked continuously but there was no marked psychomotor activity. She showed no insight or judgment.

Physical Examination: Shows a fairly well developed colored female. Cyanosis of finger tips. Neurological examination negative. Mitral regurgitation murmur. Marked fetor of breath. Gums in bad condition. Gynaecological examination showed a red, eroded cervix, with profuse discharge. Complement fixation test negative for colon bacilli and positive to three strains of streptococci. Culture of cervix gave streptococci.

Mental Status: Since admission the patient has been vol-

uble and emotional. Her conversation is spontaneous, although she is somewhat evasive. She shows a decided flight of ideas and sound associations with word "salad" and is capricious. She denies all allegations in her history, and says that she does not have ideas of wealth. There is marked distractability and retardation in her stream of thought. There seem to be no paranoid trends. No hallucinations were elicited. She is disoriented as to time; her memory, insight, and judgment are defective. Her tonsils were removed on July 31, the day after her admission. Following this she showed marked improvement, and in August, 1919, conical enucleation of cervix was done by Dr. Stone. One week after this operation she cleared up mentally. In September, 1919, six weeks after admission, she had recovered and was discharged.

This case is of interest because of the fact that the patient cleared up within six weeks compared with four months' duration of her previous attack, and that her husband recognized an entirely different attitude after her recovery, which could be compared to her previous condition in her first attack. The fact that she had a psychosis during her several pregnancies is of interest in view of the following: On June 15, 1920, she returned to the hospital for a social visit. At that time she was three months pregnant and voluntarily stated that she felt entirely different during this pregnancy; that at three months she was usually very nervous and excited, but that now she did not dread a possible nervous spell. She had gained in weight and was in perfect physical and mental health.

The principal infection in this case proved to be in the tonsils and cervix, since her bad teeth had been extracted before admission.

CASE 24: The following case is reported to illustrate the virulence of the colon bacillus combined with the streptococcus. Psychosis in a single girl, aged twenty-five, with a *Family History* unusually good, except for one neurotic paternal uncle the family was far above the average in intelligence and accomplishment.

Personal History: Rather delicate as a child, but nothing abnormal in early life. Unusual and intelligent hygienic up-

bringing. Normal school life, possibly envious of other school-mates who were more successful than herself. Otherwise the personal history was uneventful.

Onset of the Psychosis: Rather sudden, April 30, 1918, although there had been noticed a rather decided change of disposition for at least three years. She had become engaged on April 27, 1918, and her fiancé had been commissioned in the army and was expected to be called away at once. It was noticed that the patient said queer things about portents and was afraid that her fiancé would not come back. She soon began to talk at random about "God, Christ and immortality," and reacted to auditory hallucinations. Her conduct was peculiar in many ways. Her condition gradually became worse and on the first of June she had to be sent to a private hospital. Here she became much worse and could not be controlled so that it was necessary to send her to the Bloomingdale Hospital, White Plains, N. Y., where she was admitted June 27, 1918. The mental examination showed her to be somewhat pensive and preoccupied and at times depressed. She responded slowly to questions and when aroused was irrelevant. She showed suggestion of mischief and facetiousness in her mood. Her answers were often evasive and incomplete. She was quizzical and answered questions by asking others, often irrelevant.

Physical Examination: Revealed nothing abnormal except habitual constipation. Her teeth were pronounced normal by the dentist in spite of the fact that she had two partially erupted and impacted molars. Her tonsils had been removed some months before admission. She showed very little improvement, although her conduct was at times more normal. She was very suspicious and perplexed, very untidy in her habits and in spite of occupation, hydrotherapy, and physical education, and every effort to stimulate her interest, her condition became worse. She showed steadily increasing apathy and lack of interest. She improved slightly in her physical condition, gained some weight, and at times her conduct was better.

The following is a summary of her case made at Bloomingdale. "Considering the family history, the gradual onset and development of the symptoms culminating in a somewhat more

acute dissociation of the patient's personality with marked distortion in thinking, peculiar behavior and disharmony between mood and thought content, the disorder seems more nearly related to the schizophrenic disorders than to the exhaustive or manic depressive disorders. It seems possible that the patient might continue to improve and make partial readjustment, but a recovery without defect symptoms seems improbable."

This summary very accurately describes the mental characteristics of the patient, with which we agree, but there is no hint as to the probable etiological factors. She was discharged March 29, 1919, from Bloomingdale and admitted the same day to the New Jersey State Hospital at Trenton. Her mental condition was the same as that described in the abstract above. She was reticent and very much confused and no complete mental status could be obtained because of lack of coöperation. It was also difficult to do any of the routine tests because she was too resistive.

The physical examination showed nothing abnormal in the neurological fields. Examination of the abdomen showed marked retention of fecal matter in the cecal colon with marked enlargement of the colon in this area. Because of her resistiveness X-ray studies of the intestinal tract could not be made. The cervix was eroded, reddened and granular, and culture gave pure colon bacillus. The rectum was inflamed and there was some cryptitis.

The clinical laboratory findings in this case were important and offer some facts as to the etiology. The fixation test for the streptococcus and colon bacillus was positive, and the Wasserman test was negative. The urine findings were negative and staphylococcus aureus was found on culturing. The two partially erupted lower third molars were extracted under an anesthetic and cultures gave streptococcus, nonhemolytic, salivarius type. Examination of the stomach by the Rehfuß fractional method showed an irregular hydrochloric acid content, beginning rather high and after the fourth test dropping to a low figure and continuing to the end of the test. Streptococcus salivarius was found in the cultures. The blood count showed 6,200 leucocytes; differential count, polymorphonuclear seven-

ty-two per cent., lymphocytes fifteen per cent., eosinophiles three per cent., transitionals three per cent., basiphiles one per cent., large mononuclears six per cent.

In April she was given three doses of antistreptococcus serum and vaccine from the streptococcus isolated from her teeth and stomach. On August 15, 1919, the cervix was enucleated by Doctor Stone, a conical plastic enucleation after the Sturmdorf method, and colon bacilli were again isolated. In July an exploratory laparotomy was advised, based upon the physical examination and the fact of long continued constipation, but the family preferred to wait until other means such as vaccine and serum should be exhausted. So in September another course of antistreptococcus treatment was given.

The last of October a rise of temperature occurred and some evidence of pleurisy was noted on the left side. As she was delirious at times a lumbar puncture was done but the findings were negative and no evidence of meningitis was found. Later a deep seated abscess developed over the ribs on the left side and in a week it was necessary to anesthetize the patient and open this abscess. A large amount of pus was found and evacuated. Cultures gave pure streptococcus, salivarius type (the same type found in the teeth and stomach). At this time there was evidence of pleurisy with effusion on the left side. The condition of the patient did not improve and her temperature continued to be high. She failed rapidly and died November 7, 1919.

Autopsy was performed five and a half hours after death. There was marked discoloration on back and sides of trunk, right ear and both arms. Left lung was collapsed and pleural cavity filled with a brownish yellow flaky fluid. Some fluid in the right pleura. The colon was enlarged and the hepatic flexure bound down with pericolic adhesions. Numerous enlarged glands found in the mesentery, especially in the region of the colon and more marked in the jejunal region. There was marked hypertrophy of the liver.

Bacterial Studies: Cultures from the pleural cavity and pericardial fluid gave pure culture of colon bacillus. From the gallbladder the streptococcus salivarius was isolated (the

same type found in the stomach and unerupted wisdom teeth and in the deep seated abscess), and in other organs and mesenteric glands the cultures were negative.

This case, from the standpoint of treatment, is rightly considered a failure and will be frequently cited by our friends who are still skeptical, but from the viewpoint of pathology we cannot say that our work was in vain. The bacteriological work shows that we were dealing with a profound infection by the colon bacillus which finally caused the patient's death. The invasion of the pleural cavity and pericardium by this organism could hardly be called a postmortem phenomenon as the examination was five and a half hours after death and in other organs this organism was not found. It is to be noted that the colon bacillus was found in the infected cervix prior to operation and isolated from the tissue after operation. The other important fact is that the same type of streptococcus (non-hemolytic, salivarius strain) was found in the unerupted wisdom teeth, the stomach, the deep seated abscess and in the gall-bladder, the latter at autopsy. This fact would substantiate our claim that the original source of infection in this case was in the unerupted wisdom teeth and from there the organisms migrated to other fields. The salivarius type of streptococcus is usually considered a benign organism, but in this, as in other cases, we have reason to believe that it may become virulent at any time and cause serious trouble.

Our failure in this case can be attributed to the fact that we had no adequate means of combating the colon bacillus, a defect in treatment that has been remedied since then by the preparation of an anti-colon bacillus serum. From the pathological evidence we believe that we are justified in assuming that the psychosis in this case was the result of a combined infection of the streptococcus and colon bacillus. The question of heredity is of very doubtful influence in this case and there are no prominent psychogenic factors. The fear of losing her fiancé in the war may be cited, but it is difficult to assume that this factor was entirely responsible for the psychosis, especially as there had been a noted change of disposition for three years. The fact that she had a very intelligent upbringing and unusually hy-

gienic training is noteworthy, but when such factors as unerupted wisdom teeth are allowed to persist and habitual constipation allowed to go unchecked, it shows that the proper advice was wanting. A proper recognition of some of the factors in this case at least four years before the psychosis developed might have prevented the psychosis and later the death of the patient.

CASE 25: That the non-hemolytic streptococcus, after years of quiescence, may suddenly become active and rapidly cause the death of the patient, is shown by the history of the following case, one of six of a similar type observed by us in the last few years. The cause of death in suddenly violently maniacal patients has always been somewhat of a mystery and has usually been ascribed to exhaustion, a very unsatisfactory diagnosis; but even with the help of an autopsy we were often unable to learn anything definite. The bacteriological study of this case, taken with that of the other five, convinced us that the direct cause of death was an invasion of all the organs by streptococci. The history of the case is given below somewhat in detail, for we consider it of extreme importance, not only in clearing up the cause of death in acute maniacal states, but also in emphasizing the virulence of streptococci and their tendency to migrate to other regions with serious and even fatal consequences.

This case is a recent one and the diagnosis is in question. Whether we call it delirious mania or manic delirium, either of which would place it in the manic-depressive group—the symptoms were distinctly manic at the onset, which was very sudden, and rapidly changed to those of a manic delirium, with death in seven days from the onset of the acute symptoms, although the patient had been mentally unbalanced for some time before this. We were able to make a complete bacteriological examination in this case and obtained the streptococcus in pure culture, from the lungs, stomach, duodenum, kidneys and liver. Cultures from the brain-cortex, heart blood, gall-bladder, and pancreas, were sterile. The cause of death can hardly be questioned; the rapidity and virulence of the infection would convince the most skeptical that the streptococcus, even a non-hemolytic type, is a decidedly pathogenic organism, and

not the innocuous organism that some bacteriologists claim it is.

Female, single, age forty-three, trained nurse by occupation. Nothing special in the family history. The patient was one of several children. Her early development was normal. Fourteen or fifteen years ago she and her sister left their mother after a disagreement and the mother knew nothing of their whereabouts after that date. The mother states that the younger sister was dominated by the patient and that she might have married, but the patient did not think any man was good enough for her. They were inclined to be seclusive; had very few friends; thought no one was good enough to associate with. They were supersensitive; easily took offense. Mother states that patient was self-willed, even as a child, and that she could not control her after the age of ten. Patient had been nursing in Trenton for some years but was considered very peculiar by all who knew her. She and her sister, who was a teacher in the public schools, lived together in an apartment.

On March 21, 1918, I received from the patient the following letter:

"Dear Sir: I am an intimate friend of ————. I knew her and her family since childhood. I am a trained nurse and would like to see you in your office. Kindly let me know when convenient to you. Respectfully, C. C."

A few days prior to the date of this letter the sister of the patient, a school teacher, had an altercation with the principal of the school in which she taught; and following this she made charges against the principal, claiming that she had been assaulted. Evidence, however, supported the principal. There was considerable discussion of the matter in the newspapers, and the patient visited the newspaper offices and tried to have the matter hushed up. At that time it was noticed that she talked in a peculiar manner and was described as being intoxicated. On Sunday, March 31, the patient and her sister visited the brother of the school principal involved in the difficulty and asked if the matter could not be dropped. At that time it was noticed that both were excited, especially the patient. They returned to their apartment and later in the day the patient's sister was found dead, with both wrists cut and

the patient a "raving maniac." She made many contradictory statements, claiming that she had killed her sister, but it was very evident that she was insane. She was sent to the State Hospital on this date, March 31. In view of the nature of the letter she had written ten days before, it would seem probable that the patient had an idea she was not mentally right and made the appointment for consultation. She did not come to see me, and I did not hear about her again before the death of her sister.

When admitted to the State Hospital the patient was very violent, and fought the policemen and all who tried to do anything for her. She was put in a hot pack and $\frac{1}{4}$ grain of morphia given. She slept some, but when awake was maniacal and abusive. The second day after admission, in the evening, her temperature suddenly went up to 107.2° F.; pulse, 140. Her condition was extremely critical and she had frequent convulsions. Blood was taken for examination and lumbar puncture made. Urine was obtained by a catheter and a high saline enema of glycerine, epsom salts and soap-suds was given. She continued in this state several hours and toward morning her temperature went down to 100. She was at times semi-stuporous and at one time in a maniacal delirium. She refused to take any nourishment. Temperature ranged from 102 to 103, with very rapid pulse—from 130 to 140. She frequently stated that she had killed her sister, but her statements were unreliable and no one will ever know the real facts of the tragedy.

Physical examination showed a well nourished woman. Skin of good color. No evidences of enlarged glands. Pupils dilated; reaction somewhat sluggish. Patellar reflexes diminished. Abdominal reflexes absent. Very marked psychomotor activity. Patient slept very little, even with hypnotics. The thoracic organs showed nothing unusual. Lungs negative. Pulse varied from 90 to 150, depending very much on her temperature. Blood pressure, 140; systolic, 90. Examination of spinal fluid was negative; 4 cells per cubic centimeter. Globulin negative. Wassermann negative in the blood and spinal fluid. Fixation test negative to tuberculin bacillus; positive to streptococcus. Urine: specific gravity 1025; acid reaction;

large amount of albumin; indican present; large number of hyalin and granular casts; many leucocytes. Digestive organs: patient refused to eat or swallow anything after admission; tongue dry; teeth covered with sordes. Throat inflamed. Teeth and gums in a very bad condition; considerable bridge work, and many capped and crowned molars. The patient became more delirious and was tube-fed for three days. She became somewhat jaundiced. Temperature reached 105. On April 8 she died, at 8.15 a. m.

Autopsy was performed at 10.30 a. m. On section of the body, the panniculus was unusually thick and a deep lemon in color. Position of the abdominal organs not unusual. The pleura contained no fluid. Lungs normal except for a congested area on the lower lobe on both sides. Culture from this area gave pure culture of streptococcus. Pericardium not unusual. Heart small; tissue normally firm. Heart was not removed as it was thought unnecessary to interfere with embalming. Liver somewhat large, covered with many yellowish spots and on section showed some fatty degeneration; gave pure culture of streptococcus. Gall-bladder negative; distended and a few gallstones found. Pancreas was pathological in appearance; on the surface pancreatic tissues had been supplanted by connective tissue in many places; rather shrunk; cultures negative. Cultures taken from the stomach and duodenum, before they were opened, with every precaution observed to prevent contamination, gave pure growths of streptococcus. The stomach was empty; the walls were injected; rugae were smoothed out; adherent to the walls was much thick mucus. The duodenum was considerably injected, somewhat thickened and full of a thick yellowish fluid; cultures gave streptococcus. The remainder of the intestinal tract was not unusual. Spleen was not unusual. Kidneys were enlarged; on section much bloody fluid exuded and had the appearance of an acute hemorrhagic nephritis. Bladder somewhat distended; fluid turbid urine. Ovaries were cystic. Uterus not unusual. Brain normal in appearance, not granular in the fourth ventricle; no evidence of atrophy; pia clear, thin with no signs of meningitis; cultures from pial fluid and cortex nega-

tive. The cause of death was put down as general infection by the Gram-positive diplococcus that we have identified as streptococcus.

It was interesting to find that the heart blood, pancreas, gall-bladder, brain and spinal fluid gave sterile cultures, while the cultures from the stomach, duodenum, liver, kidneys, contained this organism. With such a general infection as was proven in this case, it is evident that it did not develop from the blood-stream but through the lymphatics. The origin of the infection was undoubtedly in the teeth, with infection of the other regions, which infection suddenly became virulent and caused the patient's death. Had we made no bacteriological examinations in this case the cause of death could hardly have been explained, although the patient had acute hemorrhagic nephritis and fatty degeneration of the liver. The bacteriology has cleared up the cause of death and also gives further evidence of the pathogenicity of the streptococcus.

CHAPTER VI

THE DEFECTIVE TYPES

THE MENTALLY RETARDED AND FEEBLEMINDED

Formerly this class was considered chiefly from the standpoint of the congenital defective, in which the defect was due largely to inheritance. It was included under the general term of feeble-minded. In many cases, there was evidence of feeble-mindedness in the parents and there could be no doubt that this defect was transmitted to the offspring. Recent investigation, however, has shown that this type is not a unit, but is composed of many classes and while some show the influence of hereditary taint, in others the condition is evidently acquired.

The mentally defective had been divided into two large classes, first, the feeble-minded or intellectually defective, second, the emotionally defective. It is doubtful whether all classes can be clearly differentiated. There are many individuals in which the intellectual defect seems to be the only pathological symptom, the patient not having any marked emotional disturbances. On the other hand, many of the moral or emotional defectives appear to have no defect in the intellectual field.

Schlapp and others divide these classes according to the pathological conditions found. First, a formative class; second, a functional class; third, a traumatic class. In the formative class the brain is not normally developed, probably because of pre-natal arrest; the condition is, therefore, largely the result of developmental abnormalities. The functional class comprises those cases in which, though there is an apparently normally developed brain, for some reason it does not respond in a normal manner to stimulation. The traumatic class comprises that in which the brain has been injured in childhood by meningitis, hemorrhage, or any trauma, which has

destroyed enough tissue to cause both intellectual and emotional disturbances.

From the standpoint of treatment little can be done for the first or formative class or for the traumatic class. If a congenital defect exists or an injury has occurred, little can be done to overcome it. There are many grades of defect observed in this class. The lowest is of course the idiot, intermediate class the imbecile, and the higher class the moron. The treatment of such cases depends largely upon the degree of defectiveness. The higher classes are susceptible to special training and can be taught useful occupations. Institutional training is perhaps the best means of caring for them. As many of these cases exhibit sexual irregularities they should not be at large, but should be confined in institutions where they can be trained and their conduct be carefully supervised.

The functional class, in which we assume that the brain is normally developed, offers considerable opportunity for treatment. In many cases the defect can be considered as acquired. The patient may exhibit both intellectual and emotional abnormalities. These individuals frequently appear normal up to a certain age. They learn to walk and talk at the usual time and at first are able to learn elementary subjects. Gradually they become dull, more or less stupid and unable to study. They fall behind in their class and are frequently diagnosed as defectives. Special classes have been formed for this group where the training is especially adapted to their mental capacity. While such training is advisable we are of the opinion that much more can be done for these individuals in the future than has been done in the past.

In a great many cases which have come under our observation, a thorough examination has revealed the presence of multiple foci of infection. It is surprising to find that many of these unfortunates have badly infected teeth, even at an early age. Malformations and malocclusions of the teeth are frequently found and often the first teeth are badly decayed. A thorough examination of the teeth, as outlined in other chapters should be insisted upon in these patients. The tonsils should also be examined and removed, if infected, and the gastro-intestinal tract investigated and infected conditions

eliminated. We have been impressed with the toxic factors found in these cases and the marked improvement which occurs when such factors are removed.

Coupled with the toxemia and chronic infections there is frequently disturbance of the glands of internal secretion. A considerable amount of investigation has been done to determine the effect of disturbed secretions of the ductless glands in these cases. Disturbances are especially evident in the cases exhibiting sexual irregularities. The interstitial sex cells show a hyperactivity and aside from causing an excessive normal activity in the sexual life of the individual they frequently cause abnormal sexual activity. These sexual irregularities cannot be controlled by the individual so long as the irritating and stimulating agents are present in the body. It has been a mistake to try to correct these evils by punishing the child. Instead of this we should attempt to find the factor which is causing this abnormal sexual activity. In cases where it is due to toxemia the removal of toxic factors will correct the abnormalities. It is more difficult to correct such conditions when the internal secretions have become extensively involved, but further investigations in this field will no doubt produce methods of glandular therapy which will be of immense assistance in treating such cases.

The following case is reported through the courtesy of Dr. Max Schlapp. The history of this case shows that the patient was perfectly well until his eleventh year. He had made normal progress in school, in a regular class, but from this time on began to have headaches. He became deficient in his school work so that he was held back. Finally, he was examined, declared feeble-minded, and sent to the ungraded class. Here he behaved just as badly. He threw things at the teacher and the pupils. At home he was irritable, cross, and threw a butcher knife at his father and a stove lid at his mother. Continually shouted, "I will kill someone." He rolled his head in his hands, repeating over and over, "Oh! my head." He threw his sister against the wall. At times he was very restless, at others would sit all afternoon and refuse to move. He changed from an energetic worker to a boy who would neither work nor play. A thorough examination and X-ray of his head revealed an

abscess of the frontal sinus. He was operated upon, pus removed from the sinus, and he seemed better immediately. A report from the teacher a year and a half later showed that he was doing normal grade work and that all his former peculiarities had disappeared and at home his mother reported that there had been a marked improvement in his conduct. Five years later Dr. Schlapp received a report stating that the boy had been constantly at work since leaving school earning \$30.00 a week.

Dr. Schlapp's comment on this case is as follows: "I do not believe that the direct irritative effect of the abscess on the central nervous system accounted entirely for his inability to adjust himself, but that in this case the adrenal gland was over-stimulated by the toxic effect of the abscess which was the cause of the emotional shocks. He was not intellectually feeble-minded, but was emotionally so unstable that he could not concentrate and was declared by a psychologist to be feeble-minded."

Dr. Schlapp emphasizes the fact that all such cases should be treated early if good results are to be obtained. Many cases should be treated long before they reach the public schools. The process may be so severe that if continued for a long period it will interfere with the normal development of the brain. This is especially true of the class known as cretins where the mental defect is due to lack of proper thyroid gland activity. This deficiency of the thyroid gland can be treated by thyroid extract, but it must be instituted early in the child's life. If allowed to go untreated the disease reaches the point in five or six years where thyroid extract has no effect on the condition.

We have had a number of cases of this functional type under observation showing many and varied symptoms which have been benefited by eliminating the foci of infection. In a great many of these cases the most important lesion was in the lower intestinal tract and a resection of the colon was necessary to eliminate this infection.

Another case is of sufficient importance to report here. The patient was a boy six years old who had been normal until two years old. He then became very restless and unmanageable so

that his mother could not allow him out of her sight. As he grew older these symptoms became more marked. At the age of two he also developed convulsions which occurred every two or three months but these did not get any worse. He was sent to school but he was unable to remain. He made no effort to learn and could not be made to obey. He caused so much disturbance that he had to be taken from school. He was not vicious, but inclined to be destructive and was very silly in his behavior. When seen by the writer he showed marked hyperactivity of a purposeless type. He moved everything about the desk and if his mother relaxed her attention he was into all sorts of mischief. A thorough examination revealed the fact that he had a very serious intestinal condition. His tonsils had been removed previously and the teeth showed nothing in particular. Examination of the stomach showed a very low hydrochloric acid content and the presence of streptococci and colon bacilli in the stomach. X-ray studies of the intestinal tract revealed abnormalities of the colon and a very marked delay of the barium meal. There was also a history of severe constipation for years.

Exploratory abdominal operation was performed November 6, 1918, and marked involvement of the ascending colon and caecum was found. The mesenteric glands were much enlarged in the ileo-caecal region, but the lesion seemed to be limited to this area. A large section of terminal ileum, caecum, and ascending colon was removed. The patient made an uneventful surgical recovery and much to the surprise of the parents and the physicians he remained perfectly quiet in bed and was no trouble to the nurse. His constipation ceased. In the course of a few months he began to show marked improvement in his conduct. He was not so restless, and his activities became more purposeful in type. The following spring he was able to enter school. He has been seen on several occasions, the last time November, 1920. His mother reported that he reacted in a normal manner to his surroundings, showing none of the peculiar conduct which he had before the operation. He attended school regularly and his teacher reported that he had no difficulty in learning.

Although this case is not reported primarily on account of convulsions it is also interesting to note that he has had no convulsions since the operation. As two years have elapsed since the operation we feel justified in considering that the removal of the infectious toxic factors in this case has been successful in changing a feeble-minded incorrigible boy into a normal one.

A third case bearing upon this problem is as follows: A boy eight years old had had chronic constipation since infancy, never having had a proper bowel movement without taking strong purgatives. Had had so-called "bilious attacks" all his life and his mother devoted as much time as she could spare to the preparation of special foods and dishes as it was only by so doing that he could be persuaded to eat at all. He had four brothers and sisters all robust, normal children but he quarrelled with them constantly. He was distinctly the *odd* and defective member of a family otherwise entirely normal in every respect. As time went on, despite the mother's efforts from being thin he became emaciated, complained of constant headache, increasing constipation and backache. His temper, always bad, grew to be intolerable; he flew into violent rages without cause or became moody, sulky, and depressed. In spite of his youth, he was suicidal, being afraid to go in a row boat lest he throw himself overboard. Finally in a fit of uncontrollable rage he tried to shoot his father with an air-gun.

X-ray revealed a six-day delay in the right colon. The right side of the abdomen was tender and rigid. When the parents were told that an operation carried with it no definite promise of improvement, they replied that any risk was justifiable as the child's condition seemed to them hopeless. At operation the impaired part of the bowel was found to be confined to a relatively short partially obstructed segment, which was removed. This was done January 6, 1920. Result January 6, 1921: Gain in weight 15 pounds. Surgical cure of constipation. No medicine since operation. Is working hard and successfully at school. Temper, appetite and general behaviour that of a normal child. Now no different from his brothers and sisters.

These three cases are cited to show that an investigation of the individual for pathological conditions existing outside of the brain is imperative and will often lead to the discovery of causes, the importance of which was unknown and which formerly appeared to have no relation to the mental defect. Just what proportion of defective children of the functional type are amenable to treatment cannot at present be stated, but enough work has been done to justify the conclusion that many of these so-called feeble-minded individuals have physical troubles and are retarded, not so much by lack of development of the brain, as through the action of various toxins and the resulting disturbances of cellular metabolism.

THE JUVENILE DELINQUENT

This type may be roughly divided into two large classes. The first may be considered, from our present standard at least, as mentally normal. Their delinquency arises from environmental causes, such as lack of proper home training and supervision, the influence of bad companions, and opportunities for petty misdemeanors, of which the child takes advantage under the impression that he will not be found out. When individuals of this class come into conflict with the law and are sent to the proper type of reform schools they soon realize their error of conduct and react to the institutional discipline in such a manner that as soon as possible they are paroled and under good influences they become upright and useful citizens.

Another large class, however, may be grouped as mentally abnormal as well as sub-normal. They may have the bad environmental influences similar to the first group or they may come from families where they have received the best training and yet they become delinquents. They come into conflict with the law and are sent to a reform school. This class presents an entirely different problem from those of the first class. Their mental defect may be of such a degree that they do not know right from wrong; show no remorse for their actions and do not react in a normal way to discipline. They have little self-control and even when they know that good behaviour means a short residence in the institution and a return to their

homes they do not take advantage of this opportunity. They continually break the rules of the institution and are constantly being punished for these infractions. They are unable to apply themselves to their work; unable to learn in school. A certain proportion of this class show very marked emotional instability, for very inadequate reasons they become hysterical and impossible to manage. Disciplinary measures only make them worse. In the extreme cases they are apt to destroy furniture, clothing, and materially upset the discipline of the institution. Because of their bad behaviour and consequent punishment they lose their rating and are not eligible for parole.

The reaction of this class is so radically different from the first that one is justified in assuming that there must be some material difference as to causation. It is difficult to say in what proportion the delinquents in institutions belong to one or other of these classes. Roughly it may be stated that about 60 per cent of the juvenile delinquents, sent to proper reformatories, realize their misconduct, react favorably to the good influences in their environment and when paroled they "make good" and seldom come into conflict with the law again. This constitutes the first class of mentally normal juvenile delinquent.

The defective delinquent or mentally abnormal class would constitute at least 40 per cent of the delinquents who not only do not benefit by their institutional training, but who when paroled soon get into difficulties again and have to be returned.

In the last few years we have had the opportunity to examine many girls of this class, confined in the State Home for Girls and similar types in the Rahway Reformatory for boys. Without exception these individuals show very marked pathological lesions or physical disturbances which we think account for their delinquency. Many of them are entirely unfit for disciplinary institutions, being in fact, hospital cases. Repeated punishment only makes them worse and such cases have been transferred to the State Hospital at Trenton for observation and treatment. A thorough examination has revealed many abnormal physical conditions. These individuals could hardly be called insane, but many of them are emotionally unstable

and even at this young age may well be considered as borderland cases. When they are transferred from a disciplinary environment they show a marked change in their behaviour. They become quiet, coöperative, and only in rare instances do they have emotional storms. Many of them realize their deficiencies and react favorably to the suggestion that there is some physical condition which can be corrected by medical means.

Practically all of them have impacted molars and other infected teeth. All of them have infected tonsils. A certain number also have involvement of the gastro-intestinal tract, and infected cervixes are not uncommon. The removal of these foci of infection has resulted in marked improvement in these individuals and many of them have been able to leave the hospital and return to their homes and employment and have continued to do well. Here again the sexual element plays a very important rôle in their abnormal conduct, and we are of the opinion that the discussion of this problem among the defectives applies equally well to the delinquents. Many of them are sex offenders and are easily misled because of hyper-sexual activity. This is due to a disturbance of the sex glands and it becomes an uncontrollable factor in their habits. It is much better to explain the waywardness and incorrigibility on the basis of physical disturbances than on a suppositional inherent badness of the individual.

Among the cases at Rahway Reformatory for Boys we find similar conditions. In a recent survey the writer examined twenty-five boys who constituted the disturbing element in the institution. They had to be punished daily for infractions of the rules and seemed to have no realization of the situation in which their misconduct placed them. All their privileges were curtailed by reason of their punishment, yet they continued in their misbehaviour. Examination of the mouth showed very bad teeth in most cases and all of them had infected tonsils. As there were no facilities for X-ray it could not be determined how many had impacted molars. The teeth which were infected were extracted and the infected tonsils removed.

Even with this very inadequate treatment eight out of the twenty-five immediately showed marked change in their con-

duct. They became industrious, reliable, and discontinued their former conduct which caused so much trouble and they have not returned to their former practices. If a more thorough and systematic investigation and treatment were possible the other seventeen could I believe also be benefited. It is a striking fact that these unstable types do not later become insane. Many of them, by progressive stages, land finally in prison.

METHODS OF DEALING WITH THE DEFECTIVE DELINQUENT

From the fact that, as we have stated, at least 40 per cent of the defective delinquents show mental abnormalities and physical disturbances it is manifestly improper to send this class of delinquents to the reformatories or disciplinary institutions, as they exist today, for at present even the best of such institutions have no means, other than disciplinary to handle them. Each institution should have, if possible, well equipped hospital wards for the observation and treatment of this class and a research bureau. But this would require the duplication of many facilities in the various institutions, whereas the necessary treatment could be better given in a central institution.

It has been suggested that in New Jersey a central clearing house should be established where such individuals could be sent for observation and treatment before being committed to the various institutions. This clearing house should, in fact, be a hospital with adequate facilities for determining the mental and physical condition of the individual. Not only could they be accurately classified, but many of them could be successfully treated and in all probability would not become a charge upon the State. This seems to be the only intelligent way to meet the difficulties which are constantly confronting the management of the various correctional institutions.

From the fact that many of the inmates of the reformatories have to be transferred later to the only place where they can obtain treatment,—that is the State Hospital at present,—it would be much better from the standpoint of the individual

that these patients be sent at once to a clearing house and then later disposed of according to the results of examination.

It is also true that the institutions for the feeble-minded should have adequate hospital facilities for observation and treatment rather than be conducted exclusively as custodial and training institutions. More and more evidence is being brought forward that the medical aspect of the problem should be more thoroughly considered in both the defective and delinquent types. A better appreciation of the medical aspect of this problem will undoubtedly save many patients now branded as feeble-minded and doomed to life-long confinement in an institution. As at a very conservative estimate it costs the taxpayers \$5,000.00 to support each of these patients throughout life, this problem has an economic as well as philanthropic interest.

CHAPTER VII

MENTAL HYGIENE

PREVENTION OF MENTAL DISORDERS

From what has been said in the foregoing chapters regarding the causation and treatment of mental disorders it can readily be seen that the knowledge thus obtained can far better be applied in the field of prevention. With a better understanding on the part of the physicians and the laity of the fundamental principles herein outlined it seems reasonable to assume that these methods should be adopted long before the marked mental symptoms develop. If the mental disorder is the result of long standing infection and accumulation of the toxic poisoning, as a result of this infection, then it would be much more logical to check this infection at the onset rather than to wait for the mental symptoms to appear.

The goal of all scientific medicine today is prevention and we believe that in the future the greater part of the types of mental disease which we have been discussing can be entirely prevented. Some of the principles which can be successfully put into practice, even during the age of childhood are therefore of first importance.

MENTAL AND PHYSICAL HYGIENE OF THE CHILD

In a large majority of cases of dementia praecox, especially when the psychosis develops about the age of twenty, our investigations have shown that the chronic infection has existed probably since childhood, so that to be effective preventive measures should be applied as early as possible.

The importance of proper methods of training and education and the influences of the proper environment upon the mind of the child cannot well be over stated. These are, of course, very valuable, but even in children who have had the

best training and an ideal environment, the essential factors in the causation of the mental trouble have been seriously neglected.

CHILDREN'S TEETH

The proper attention to children's teeth is of the utmost importance and by proper attention we do not mean the ordinary routine of having the child brush its teeth daily, for we have found that this in itself is not all that is necessary. The first teeth of children often decay, even with the best of care,—the reasons for this we will discuss later. Whatever the cause, we have always found decay associated with infection. There can be no doubt that small cavities appearing in children's teeth can be properly filled and the decay arrested, but when this has become extensive, in all probability the tooth is doomed and extraction is the only safe method to be adopted. We have found many cases of badly decayed teeth in children with extensive and serious apical abscesses. If these infected teeth are allowed to remain undisturbed there can be no question that the second teeth will become infected from them and thus the process will be continuous. By removing this infection in the first teeth (by extraction) the second teeth will have some chance to be healthy.

There has been some hesitancy on the part of dentists to extract the first teeth. They think that it interferes with the proper alignment of the new teeth and that often the new teeth will not have room to erupt. While this may be true we are of the opinion that it is more important to get rid of the infected teeth than allow them to remain in, for the above reasons.

When the second teeth have erupted they should be frequently examined by competent dentists and radiograms made to detect the presence of infection and especially the formation of impacted teeth. It is true that the wisdom teeth or third molars should not erupt in a child until the 17th to 25th year, but radiograms of these teeth will determine whether or not they are forming properly. In the case of a boy of thirteen who suffered from an acute maniacal attack, X-rays of the teeth showed a third molar growing in a horizontal position and

already showing evidence of impaction (Fig. 30). His tonsils were also infected. Whenever such diseased or abnormal wisdom teeth are found they should be extracted as they will never be of any use to the child and may later cause serious trouble.

If the child's teeth are rough and with difficulty are kept clean then they should be treated by "planing" and the teeth made smooth. In some states young women are being specially



FIG. 30

trained to do this work. Dr. Jane Kennedy of Minneapolis has practiced for years the giving of an acid fruit to the child at the end of each meal. She believes that this tends to prevent dental infection and decay, and the suggestion is well worth considering.

TONSILS AND ADENOIDS

It hardly seems necessary today to call attention to tonsils and adenoids in children. Fortunately, the importance of removing infected tonsils and adenoids is well understood by everyone and the parents would, today, be considered extremely negligent if they allowed infected tonsils and adenoids to remain. In spite of this fact, however, we see many patients around the age of twenty with badly infected tonsils, which have been allowed to persist, and they have to be removed after the development of mental symptoms. Infection of the tonsils may occur at a very early age and we have observed one case of severe neuritis in a baby eighteen months old,—due

to infected tonsils. There is no doubt that a large proportion of the children of the present generation will have had their infected tonsils removed before they have caused serious trouble.

GASTRO-INTESTINAL TRACT

The proper hygiene of the gastro-intestinal tract is as important in children as in the case of adults, and is of equal importance with the teeth and tonsils. Symptoms showing disturbances of the gastro-intestinal tract should not be considered lightly. Recurrent "bilious attacks," often with vomiting and pain, mild attacks of indigestion or slight evidence of "stomach trouble" should suggest a chronic infection of the appendix and a competent surgeon should be consulted. Errors in diet may, rarely, be the cause of these upsets but very much more often a chronic appendix is at the bottom of the trouble. Such children are often diagnosed as having "pancreatic insufficiency," a term about as meaningless as "neurasthenia." Habitual constipation in the child should be regarded seriously. It may be occasionally the result of lack of proper training in these matters, but it may also come from chronic appendicitis or from rectal troubles.

In families where the parents and children are affected with habitual constipation the reasons may be the same in both instances. We have many cases on record where similar operations have had to be performed upon parents as well as their children to correct these difficulties. Hereditary anatomical deviations and abnormalities in the bowel which tend to intestinal delay may be present in both generations and this sluggishness always furnishes a fertile soil for infection. Instead of treating such conditions in the child with purgatives and diet, X-ray studies should be made to find out whether serious anatomical and pathological lesions exist as the cause of the trouble.

Such conditions should be corrected by the removal of the infected appendix. This, if not removed, will, in the course of years, either terminate in acute appendicitis, thereby endangering the patient's life, or produce serious lesions in the colon, the gall bladder and the stomach, producing chronic intestinal

invalidism. Appendicitis is nothing more or less than a localized peritonitis. We have observed serious lesions of the colon in children as young as three and a half years which could be corrected only by surgical procedures, and Ochsner has reported appendicitis, confirmed by operation, in more than fifty babies under a year of age. (See Fig. 31.)

THE "NERVOUS" CHILD

Many children of the present generation are designated as "nervous" and while various causes have been given for this malady usually if the parents are inclined to be nervous the child is supposed to have inherited this from them. Very often these symptoms are given very little consideration and no attempt is made to find a possible cause. It is quite essential that the training should be along the lines which will lessen this nervousness. Such children should not be sent to school early, in fact, frequently, should not be sent to school at all until these symptoms disappear. When they are sent to school they should go preferably to a small one and for only a few hours a day. At home they should be kept from all excitement and made to take considerable rest, both at night and during the day. Every effort should be made to build up the patient's physical condition. They should be made to take plenty of carbohydrates and fats, and milk and eggs should be given between meals, up to the point of protein toleration.

Aside from these routine measures every effort should be made to find out any abnormal physical condition. The teeth and tonsils should be thoroughly investigated and any infection found, removed. The gastro-intestinal tract should have a thorough examination, especially where there are any symptoms of so-called "stomach trouble." Attempts should be made to get the child into regular habits and not allow him to become constipated. It may be impossible to overcome these conditions by habit and training and surgery may be necessary to relieve this condition. Often a chronic, infected appendix may be the principal cause for this nervousness.



FIG. 31. Enlarged cecum and dilated terminal ileum in a defective child four years old. Note the numerous enlarged mesenteric lymph glands which should normally be microscopic in size. Cultures from these glands gave streptococci and colon bacilli in abundance.

SEXUAL IRREGULARITIES

Often in these children there is a precocious sexual activity. Masturbation may begin very early. Frequently this comes from teachings of other children or it may come spontaneously as the result of abnormal physical conditions causing irritation. There is, undoubtedly, some disturbance of the internal secretions which may be caused by chronic foci of infection. The child should be kept under observation, as far as possible, and the parents should know the character of the child's playmates. Neglect of the child at this period of development may result in serious habits and consequences.

A frank discussion of sex life is advisable with all children. They should be taught early of these matters by their parents for they will undoubtedly learn them from other children. The most critical period of life is at puberty, especially for girls, and no child should go through this period without a thorough understanding of the situation, told preferably by the parent. The habit of punishing children for these bad habits, when they are found out by parents is as a rule very unwise. The child should be frankly told of the dangers in such a way that it will not become frightened and brood over the matter. Wherever possible, abnormal physical conditions should be corrected, especially those which tend to stimulate the sexual organs. A great deal can be accomplished by proper training and instruction, but if there is some fundamental physical trouble the removal of the same will be of much more value than any training.

TRANSMISSION OF INFECTION FROM PARENTS TO CHILDREN

It is hardly necessary in these days to call attention to the terrible results in the children of venereal diseases in the parent. We would emphasize the fact that in order to have healthy children the parents should be free from any venereal diseases. Syphilis in the parents frequently is transmitted to the child as a direct infection. In many cases it will cause the death of the child, either at birth or later on. In some cases, the child will show no evidences of infection until a later age (12 to 20 years) when it may gradually develop juvenile

paresis or softening of the brain. In such cases the mother will show no evidences of syphilis, but the child will be born with the germs in the body. The gonorrheal infections are usually limited in their effect to the eyes of the baby, and every physician knows the necessary precautions to prevent this.

Aside from venereal infections we would emphasize the danger of infection in the parents' mouths and its relation to infection of the child. We have not been able to determine definitely the origin of infection in teeth and tonsils in children, but an investigation of the condition of the parents' mouths would lead us to conclude that there is a strong possibility that the child received infection by contamination from the parents. So it would behoove the parents to be sure that they have no infected teeth or tonsils through which the infection might be transmitted to the child. It is true the parent may have infection of the teeth and tonsils and not suffer at the time from any systemic effects of such infection. The organisms may not be causing them any trouble, because they have sufficient immunity to control the infection, but they may become very virulent when transmitted to the mouth of the child.

The best insurance for the children's health lies, in the first instances, in maintaining a healthy condition of the parents' mouths. Many people cannot understand how their children become infected until it is pointed out to them that the condition of their own mouths may have had a direct bearing in transmitting infection to the child. Therefore, ignorance of these facts or negligence in caring for their own mouths may be, later on, the cause of serious trouble in the children.

ORGANIZATION OF A MODEL PSYCHOPATHIC HOSPITAL

It is a well known fact that practically none of the hospitals for the insane, as they exist today, are equipped with the facilities for carrying out the methods necessary for a proper diagnostic summary of the *individual as a whole*. We cannot believe that nothing exists in the patient "below the eyebrows" and that it is proper for the psychiatrist or the

neurologist to confine their investigations to that elusive and incomprehensible part of our make-up—the mind.

That it is below the dignity of the psychiatrist to consider himself responsible for or interested in the physical condition of the patient is a fallacious and incredible viewpoint. Those who have the care of the insane must admit that old-fashioned conceptions and the treatment based upon them must be superseded by the more rational modern ideas. *Clear thinking* and *readjustment* to the problems of life are far more important in the physician than in the patient.

More in truth than in jest may it be said that psychoanalysis will in time be superseded by gastric analysis. Other analytical studies of the *physical* factors in the individual will be equally important. It was justifiable for us to be concerned with elaborate personality studies and psycho-analytical interpretations when our limited knowledge precluded any other form of investigation and treatment. Now to this must be added the modern methods of general medicine. To psychology is due credit for a better understanding of the mental processes,—normal and abnormal. Its employment should not be curtailed as long as it is confined to the study of the symptoms and is not permitted to wander in the field of causation and treatment. Here psychology failed for the simple reason that factors, other than those embraced in this science were at fault.

It must be remembered that psychologists, as a whole, are not psycho-analysts and do not approve of applying their highly developed science to the healing of disease. Where, in the works of James or Bergson will you find any trace of modern psychoanalysis? Does not psychoanalysis, in its extreme form, bear a somewhat similar relation to the science of psychology as christian science bears to scientific medicine?

In order to diagnose and treat these physical disease processes, the psychiatrist should enlist the aid of the progressive medical and surgical minds, who are universally willing and eager to give their time and energy in an effort to solve these difficult problems.

An ideal organization for a State psychopathic hospital and

research bureau for State institutions will be outlined. The staff of a psychopathic hospital should be under a director who is necessarily a well trained psychiatrist, but trained to appreciate the progress of modern medicine as well as psychiatry. There should be a consulting board of capable and interested men, representing the various specialities on one hand, and an advisory board on the other hand, made up of the heads of the various State institutions,—those devoted to the care of the delinquent, as well as those concerned with the disabled both mentally and physically.

This conception of the necessity for a closer bond and inter-relationship of these various agencies is now being very efficiently carried out in New Jersey under the able and intelligent direction of Burdette G. Lewis, Commissioner under the efficient reorganized State Board of Institutions and Agencies. His was the conception of this experiment in state charitable work, and if allowed to prevail time will prove the wisdom of his ideas.

In spite of the many difficulties—political and economic, which had to be overcome, it has been already demonstrated that such a plan is both feasible and profitable for the State. New Jersey and its institutions are to be congratulated upon having a commissioner of so broad-minded an attitude and so versed in practical idealism, and without whose helpful co-operation and encouragement the investigations and results discussed in these pages would have been well-nigh impossible. He has helped to show that the problems of the insane are not so foreign to those of the criminal, as has been supposed, and that methods applicable to the one should apply to the others. And further, that ideas developed through research in one institution should be available for the others.

Figure 32 which illustrates the ideas of the unity of these various institutions, is the result of a combination of the ideas of the writer and Commissioner Lewis. By eliminating the other institutions on the last line it could be adapted to a psychopathic hospital or a psychopathic department of a State Hospital, for the organization illustrated in Figure 32 applies to a research bureau for all the institutions.

Proposed Central Research Bureau of Medicine and Psychiatry. Functional Organization Chart.

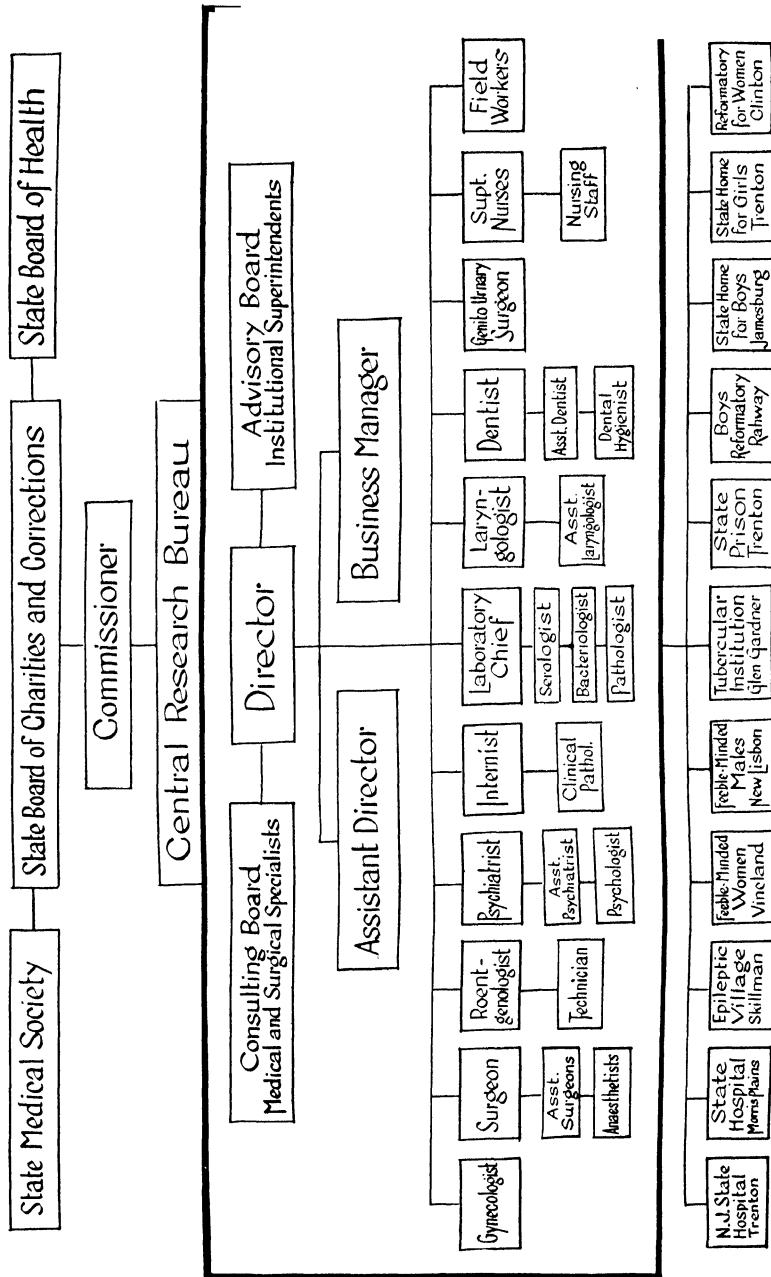


Fig. 32

The Director would be under the supervision of the State Board of Institutions and Agencies, a much better title by the way than the old Board of Charities and Corrections. The State Board would be in touch with the State Medical Society and the State Board of Health. Under the Director would be an assistant director or a psychiatrist who would act as an executive officer. A business manager would be under the Director, but if efficient, with enough latitude to carry on his department almost independent of the director.

In the center has been appropriately placed the laboratory chief, for in the last analysis this department is really the heart of such an institute. Under the laboratory chief would be the serologist, bacteriologist and pathologist. These departments, while independent, are of course closely related. Capable and experienced technicians, in sufficient numbers, would be furnished to carry on adequately both routine work and original research.

A capable internist should be a member of the Staff,—preferably in a visiting capacity,—as it would be difficult to obtain the services of the man with proper experience as a resident. Under the department of internal medicine would be the division of clinical pathology, including blood chemistry, metabolism, and the examination of the blood, sputum, stomach contents, spinal fluid, and other work in this important branch of medicine.

For the proper study of the mental symptoms a psychiatrist would, of course, be necessary. Under this division would be placed the assistant psychiatrists. A roentgenologist or X-ray expert would be an essential part of this organization with proper and efficient assistants. The necessity for a thorough X-ray study of the psychotic individual need hardly be emphasized.

The surgical division would embrace the highly specialized abdominal surgeon, the gynecologist, laryngologist and the genito-urinary surgeon. These could all be given separate divisions as their work is of equal importance. They would necessarily be visiting members of the staff as it would be impossible for the State to pay enough for the whole time of

these men. Members of the staff could be assigned to assist the surgeon. There should be a visiting as well as a resident dentist and in this department there should be facilities for the proper restoration of the patient's teeth, and a dental hygienist should also be added.

Many of the patients, after the infected teeth have been removed and they have returned home, cannot afford to have the proper restoration work done, or, if they can afford it, they will fall in the hands of dentists who often by improper methods, devitalization of good teeth on which to anchor bridge work, etc., produce the same conditions that were corrected in the hospital. So it would be very necessary to look after this phase of the work. Patients who were able would be asked to pay a nominal fee for this work, and those unable would receive this attention free.

A competent and efficient superintendent of nurses should be at the head of the whole nursing staff,—of necessity with general hospital training,—and preferably with some experience in the care of the insane.

The after-care department should be adequately developed and the discharged patients frequently visited or as often as necessary. Enough field workers should be available for the proper working of this department.

Only a few years ago such a plan would have been looked upon as the vain imaginations of a deluded individual, yet such an organization, with properly equipped laboratories and operating room facilities, and adequate X-ray department are some of the immediate needs of the State hospitals. Such a clinic, we are happy to say, is practically in operation at the State Hospital at Trenton and has been, after much laborious work, for the last two years. Yes, it will cost money for such an organization and the necessary equipment, but the State will be repaid a thousand times, not only in dollars and cents but by the conservation of "the brain power of the nation."

The medical and surgical supplies necessary for such work, with the supplies for laboratory and X-ray department, in a hospital the size of that at Trenton, with nearly 800 admissions

annually, will cost \$25,000 or \$12.00 per capita,—a seemingly large sum,—but when the State will save \$90,000 in maintenance alone, this is not an exorbitant price to pay for such work. Salaries for technicians will amount to about \$12,000 a year. This can all be supplied by the current per capita cost as the money used here can be saved from other places where it is ill spent at present. The State can well afford to pay adequately for the services of the visiting men as it would be a paying investment.

COMMUNITY SURVEYS

In the community at large much can be accomplished in preventive measures by a proper realization of the facts outlined in this work. A proper recognition by mental hygiene societies of these facts, in coöperation with social welfare organizations, can make a survey of communities valuable, especially of the indigent class. Such a survey should include free psychiatric examinations of these individuals. A thorough medical examination also should be made, and any abnormal physical conditions should be corrected.

The value of this survey would be that the individuals, especially of the indigent class, which later go to make up the population of State hospitals and correctional institutions, could receive the proper treatment at the time when the preventive value of such treatment would be incalculable. As we have stated before, the individuals who make up the population of State institutions of all kinds, should not have to wait until they arrive at these institutions before corrective medical measures are applied to them.

Even if the State had to support such work in the community the financial outlay would be far less than the continued support of some of these individuals for the remainder of their lives. By enlisting the aid of progressive medical men in the community who now, as always, have been compelled to do a large amount of work without compensation, these individuals could receive proper treatment.

Such a survey, naturally, would apply to the children of school age. I am informed that this is now being conducted

in the public schools in the city of Rochester, N. Y., where 85 per cent of the children receive dental attention and in 65 per cent infected tonsils have been found and removed. Medical inspection of the schools which is carried out in a somewhat fragmentary manner in most cities could be made to be more efficient. It is not only necessary to look out for contagious diseases, malnutrition, etc., in these school children, but the hidden foci of infection should be located and eliminated.

In New Jersey, we are glad to say, such a community survey has been organized in Monmouth County. This work has been undertaken by the Monmouth County Organization for Social Service under the direction of its efficient and indefatigable president, Mrs. Lewis S. Thompson. As a member of the State Board of Institutions and Agencies, she has had the opportunity of studying these problems and has a thorough realization of the necessity for pre-institutional work in the community. Already this experiment has been started and it is not too Utopian to predict that as the result of her initiative and effort many of these individuals will escape the unhappy fate which otherwise would have been in store for them, without the application of these principles.

This type of survey would be on the broadest possible lines. It is useless to make a survey of the intelligence of the community demonstrating statistically that there are so many sub-normal individuals and individuals with inferior intelligence. The main problem should be to search for the causes of these conditions. When this side of the question is approached in the broadest sense, as outlined above, then, and then only, can results be expected.

CONCLUSION

Such is the outline of the work which *has* been done. What *can* be done, the future only will reveal. Emphasis should be laid upon the necessity and importance of the adoption of such a plan of coöperative effort to provide means for the proper diagnosis and interpretation of the physical disturbances, now known to stand in causal relation to the so-called functional psychoses.

This alone will provide basis for the proper treatment of the psychotic, the defective and delinquent individual. When made generally effective throughout the country, it is a melioristic prediction, that many patients now doomed to life-long confinement in hospitals for the insane and to a mental darkness to which death is far preferable, can and will be restored not only to mental health, but in many cases to a life of usefulness. Economic independence will follow, superseding dependence upon the state, and thus the alarming increase in insanity will be automatically checked.

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